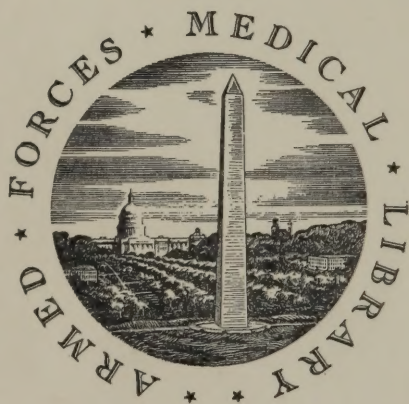
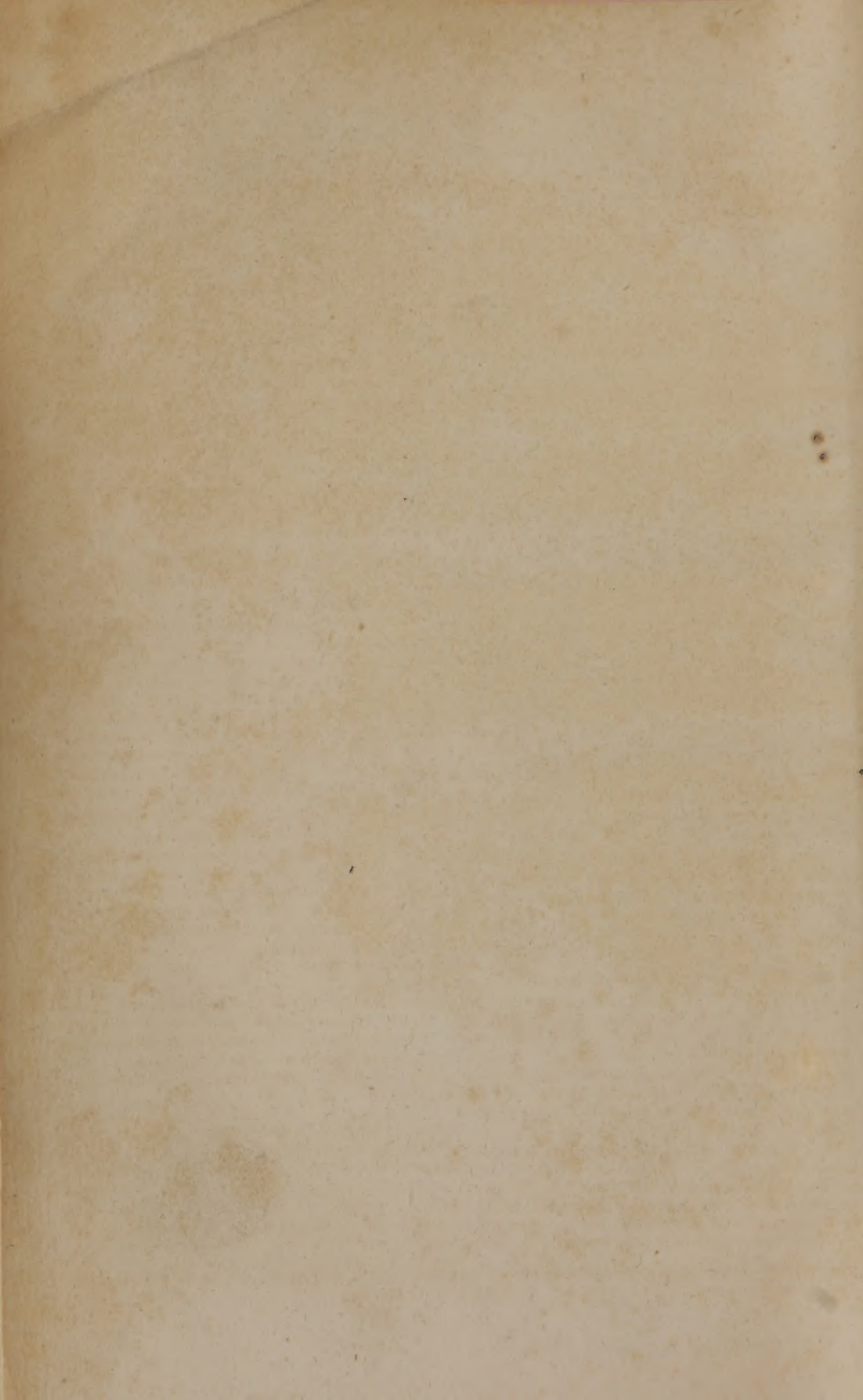


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 ‘ its Lecturers in Surgery the names of Cheselden,
 ‘ Sharp, Warner, Else, and last, although not least,
 ‘ of my most able and judicious preceptor and predecessor, Mr Cline.

‘ I am,

‘ Yours very truly,

‘ ASTLEY COOPER.’

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LECTURES, &c.

LECTURE I.

GENTLEMEN,

THE subject of this evening's lecture is, Irritation; which, being the foundation of surgical science, you must carefully study and clearly understand, before you can expect to know the principles of your profession, or be qualified to practise it creditably to yourselves, or with advantage to those who may place themselves under your care.

The doctrine of irritation teaches the immediate and remote effects of injuries; in what manner nature restores them on the one hand; and, on the other, the mode in which apparently trifling accidents prove ultimately destructive.

It is easy to conceive how the division of a large artery occasions death by hæmorrhage; but to explain the means by which an apparently slight injury, as a scald or a burn, produces the same destructive effect, requires an intimate acquaintance with the subject of irritation.

The actions of the body supported by natural stimuli, directly, remotely, or by sympathy. — All the actions of the body are excited and sustained by internal and external impressions, which are called stimulants; as the blood is the stimulus to the blood-vessels, the

bile to the intestines, and heat, in a certain degree, to the whole system; and there exist between all parts intimate relations, corresponding with each other and carrying on a reciprocal intercourse of action. The beautiful harmony produced by a perfect concurrence of all the actions, is called health. Thus, impressions not only produce effects on the part to which they are directly applied; but, in consequence of the freedom of nervous communication, remote parts of the body are becoming affected by them, and many of its natural functions are supported by sympathetic communication. The real nature of sympathy is yet unknown, but we are acquainted with many of its effects; and, as an example, we may give the communication which exists between the uterus and breasts; as the former is impregnated, and the various changes proceed in it during the period of gestation; so corresponding alterations are proceeding in the breasts, the glands enlarge gradually, the nipple becomes elongated, and the secretion of milk commences; thus, before the child is born, nature has carefully provided for its future support. Many other of the natural functions of the body are supported upon the same principle; as sneezing, which is a sympathetic action between the nose, velum palati, and the abdominal muscles, instituted to remove causes of irritation from the nose: coughing, which is a sympathy between the larynx and abdominal muscles: breathing and the expulsion of the fæces are also sympathetic functions, and with these a multitude of other examples might be given.

Diseased Sympathy. — But sympathetic effects also follow injuries and diseases, and become the causes of restoration on the one hand, or of destruction on the other; and this state of the body is called irritation.

Definition of irritation. — Irritation may be defined to be, an altered action excited in the body by an unnatural impression.

Irritation of sensation. — Irritation sometimes produces only diseased sensation; thus a sympathetic pain is experienced in the knee and foot from diseased hip; when a person has a stone in his urinary bladder, acute pain is felt at the extremity of the penis; the passage of an urinary calculus through the ureter occasions retraction of the testicles and pain in the thigh; a diseased prostate gland produces pain in the inner part of the thighs; disease of the uterus occasions pain in the loins, and around the hips, and sometimes weakness of the inferior extremities, amounting nearly to a state of paralysis; pain and heat in the throat arise from a morbid state of the pylorus; itching in the nose from worms in the intestinal canal; pain between the shoulders from affection of the liver; and pain in the loins from inflammation of the testicles.

Diseased action produced by irritation. — But by irritation, not only diseased sensations but morbid actions are excited in other parts, which are near and intimately connected, or in distant parts; thus inflammation is produced in the testicle from irritation in the urethra. Swellings in the breast are frequent consequences of morbid change of the functions of the uterus; the diaphragm is frequently thrown into convulsive action, from gangrene of the most remote parts; producing hiccough: retention of urine I have known more than once occur after the operation for popliteal aneurism. But there is no organ more frequently affected by irritation than the stomach. For instance, a blow is received on the head, occasioning injury to the brain; vomiting is one of the first and most constant symptoms, and by this we are led to detect such injuries. Vomiting

is produced when the testicles are injured; when the intestines are burst, wounded, or strangulated, and from a gall-stone passing the biliary duct: injury to the iris frequently occasions vomiting; and an obtuse pain in almost any part of the body will occasion sickness.

Course of irritation. — Irritation is generally communicated through the medium of the nerves, of which there are two systems in the body; the first, composed of the brain, spinal marrow, and their nerves, which naturally convey sensation and volition; the second, consisting of the grand sympathetic nerve, the centre of which is behind the stomach, in the semilunar ganglion and solar plexus. The modes of sympathetic communication are various. In some instances, the course of irritation is from the irritated part to the sentient extremity of the nerve, as the pain experienced in the knee and foot from a disease of the hip; or the pain in the little finger and half of the ring finger, when the ulnar nerve is struck at the elbow: injuries of the brain produce vomiting, their influence being imparted to the stomach through the medium of the eighth pair of nerves. In other cases, the course of sympathy is from the affected part to the origin of the nerve; thus pain in the loins is consequent on diseased testicle; or pain between the shoulders from affection of the liver. Occasionally the sympathetic communication is through the brain, as the following case will prove. Mr Toulmin, of Hackney, attended a lady on account of her suffering severely from a diseased tooth, and she appeared also to be afflicted with hemiplegia. Mr Toulmin extracted the tooth by the lady's desire, and in a short time the paralytic affection entirely subsided.

Irritation on the nerves of the grand sympathetic is communicated to the stomach probably through

the medium of the semilunar ganglion, and vomiting is directly produced, also in strangulated hernia, or when biliary or urinary calculi are passing the respective ducts, or when a severe blow is received upon the testicle. The other system of nerves, viz, of the brain, spinal marrow, &c, are less affected in these cases; and, even when injuries prove fatal, the absence of cerebral sympathy is remarkable, as the patients are generally quite collected, until nearly the last moment of their existence.

Irritation is local or general.

Local. — Sometimes it is local only; thus, a decayed tooth will produce an abscess, and the matter escape by forming an opening through the cheek: this ulcer will be very difficult to heal, if the tooth remain; but extract it and the disease will quickly disappear, the cause of irritation being removed.

Many cases of this kind have fallen under my observation, and I will relate a few of them by way of illustration.

Case. — Some years since, two persons came to consult me from the same town (not knowing each other's situation or intention); each of them had an abscess near alveolar processes; which, on examination, I found extensive, and it had produced an opening through the cheek. The disease had been of long standing in both cases, and occasional pain was experienced in the surrounding parts of the jaw; I directed a diseased tooth, near the ulcer, to be drawn; which being done, the patients quickly recovered.

Case. — A lady was for a long period afflicted with a fungoid granulation, which protruded through an ulcerated opening in the cheek: she tried for several months every remedy that was recommended to destroy the fungus, but without producing the desired effect; a tooth, nearly opposite the opening, be-

ing occasionally painful, she was advised to have it extracted; this was done, and there was no longer a difficulty in curing the fungoid growth; for it was absorbed rapidly, the most simple applications only being used.

Case. — A gentleman, of my acquaintance, was much annoyed by an ulcer on his chin, every attempt to heal which had proved abortive; at length one of the neighbouring teeth became painful, and was in consequence extracted; when, to the great delight and astonishment of the gentleman, the ulcer on his chin healed rapidly. These cases are mentioned to show the necessity of seeking, with all possible care and attention, for the causes of irritation; as the removal of them is often alone sufficient to effect a cure, and always to afford relief, which would not otherwise arise. Most of you have probably experienced the suffering produced by the irritation of an extraneous body lodging under the eyelid, and the instantaneous relief afforded by its removal.*

General. — Of the *general effects* which are produced by irritation, we may mention the following: a person has a bougie passed into his urethra for the first time, the urethra is irritated by it; he says, I feel faint; becomes sick, looks pale, and, without care, he drops at your feet; his pulse has nearly

* A man, who was employed at a manufactory for fire-arms in the country, was struck by a small scale of metal in the eye; it penetrated the anterior part of the cornea, and became fixed between its laminae; it produced considerable irritation and inflammation: numerous attempts were made to extract it, but without success, and the irritation and inflammation increased in spite of the very active means used to subdue them. After a few days he was sent to town, with a note, requesting I would give him my assistance; with some little difficulty I succeeded in removing the foreign body from the cornea, when the irritation and inflammation quickly subsided, and in a few days he again returned to the country with only a small speck on the cornea, in the situation of the wound. — T.

ceased, and his body is covered with a cold perspiration; you place him on a sofa, with his head a little lower than his body, and, as soon as the blood freely enters the brain, all his functions are restored: thus by irritating the urethra the stomach is influenced, the actions of the heart are suspended, and the powers of the mind vanish. In irritation of the urethra, on the evening of the same day to the introduction of the bougie, rigors, succeeded by heat, and profuse perspiration, are common consequences. Fever is excited in dentition, and a paralytic state of some part of the body is not an unusual consequence: a child frequently loses the use of one arm, or one leg, or sometimes of both legs, from the determination of blood to the head in this fever.

Slight injury to the stomach, although it does not occasion any sensible organic change, will sometimes destroy life. A man, recovering from fever and walking in Fleet Street, quarrelled with a woman; another female came up, and gave him a blow in the region of the stomach, which caused almost instantaneous death. Upon dissection, to discover the cause of his expiring so suddenly, no morbid change was perceptible.

Case. — A healthy labourer, belonging to the India House, was attempting to lift a heavy weight, when another labourer came up, and said, ‘Stand on one side, let an abler man try;’ at the same time he gave the former a slight blow on the region of the stomach, when the poor fellow immediately dropped down and expired. On examination of his body there was not any mark of violence discovered.*

Usual symptoms of general irritation. — The symptoms of constitutional irritation which follow accidents will be best exemplified in compound fracture.

* Query — Does the blow affect the semilunar ganglion?

A person receives an injury to one of his legs, occasioning a compound fracture of one or both bones : constitutional irritation soon commences ; he first complains of pain in his loins, as if from an uneasy position ; this extends to the back, in the course of the spinal marrow to the brain, occasioning pain in the head ; he then becomes restless, and his countenance expresses anxiety ; the tongue, at first, is covered with a whitish fur ; but as the irritation increases it becomes yellow, and subsequently, in the aggravated stage, it has a dark brown coating ; loss of appetite, nausea, and vomiting, evince derangement of the stomach ; the secretion of the liver is so far diminished, that bile is produced in very small quantity, so that the motions are white, and sometimes a fluid is produced, which differs much from bile in its appearance.* The secretion of the intestines is diminished and unhealthy ; the bowels are constipated, the kidneys secrete but little urine, and it is of a deep colour ; the skin has its secretion stopped, and it is hot and dry. As these symptoms arise, the pulse quickens, becomes hard, irregular, and ultimately intermittent : corresponding alternations take place in the respiration ; it being, at first, somewhat quicker, and finally much hurried and laborious. The functions of the brain, spinal marrow, and nerves become further changed ; subsultus tendinum is produced ; slight impressions on the senses become almost intolerable ; the mind is at first hurried, and then the patient sinks into a low,

* A child received a blow on the head, which occasioned inflammation of the pia mater, of which it died. On examination after death, a colourless fluid was found in the gall-bladder, some of which is preserved in a glass tube, in the museum at Guy's Hospital.

When great constitutional irritation exists in children, their motions, when exposed to the air, become green, and this is more particularly the case when the brain is chiefly affected.

muttering delirium. The grand sympathetic nerve becomes further affected; the abdomen swells from accumulated flatus in the intestines; vomiting and purging often both occur; hiccough is produced, and the patient, absolutely worn out by irritation, expires. Thus in constitutional irritation, whether from injury, or from external or internal disease, every part of the system may be affected, and it appears to take place in the following way: When a part of the body receives an injury, the nerves convey a knowledge of it to the important organs, as the spinal marrow, brain, heart, stomach, &c: nature immediately commences the restorative process, by stopping all the customary secretions; the various outlets being thus closed, the blood collects in quantities in the heart and large blood vessels, which propel it with unusual force to the injured part; giving rise to inflammation in whatever form can best accomplish the desired effect. This is an illustration of the manner in which nature contends for a cure; she occasionally requires to have her ardour checked, or aided, in proportion to her powers: we must watch with 'eagle's eyes' her proceedings, and be exceedingly cautious in our interference; for by restoring the natural secretions too soon, we may, by thus abstracting blood from the injured part, prevent the restorative process; or, by adding to excitement, we may prevent the beautiful and judicious operations of nature, by producing too much action.

The degree of constitutional irritation resulting from injury depends on several causes.

The importance of the part injured.—1st. On the importance of the part injured. A blow on the abdomen from the kick of a horse, by which one of the intestines becomes burst, renders the pulse scarcely perceptible at the wrist, covers the body with a cold perspiration, and destroys life in from twelve to eighteen hours.

The extent of injury. — 2dly. In parts less important, on the extent of injury, as compound, when compared with simple fractures.

The nature of the injury. — 3dly, On the nature of injury, as in wounds: if a wound be a simple incision, it easily heals; but when contused, the parts must slough, before the injury can be cured; punctured wounds also, by the influence on the nervous system, frequently occasion tetanus.

The difficulty of restoration. — 4thly. On the difficulty of restoring the injured part, as wounds of ligament, tendon, fasciæ, or cartilage; and parts possessing but little vital powers, as in wounds and diseases of joints.

State of the constitution. — 5thly. On the state of constitution at the time the injury is received; this varies at the different periods of life, and is modified by the patient's habits, his mode of living, and the climate in which he resides. Excessive irritation frequently follows operations on very young subjects. but rarely those performed on very old persons. I have known children, after having undergone the operation of lithotomy at a very early period, die of convulsions. I should not, therefore, recommend the operation to be performed on a child under the age of two years. I have, however, operated successfully for lithotomy, at the age of one year and nine months, but am disposed to recommend its postponement when possible. In infancy the irritability is excessive, and the system is easily excited to destruction: after the period of two years, the irritability is considerable, but the powers of restoration are great. In middle age, the irritability is less, and the restorative power still considerable: in age the irritability is much diminished, but the powers of restoration are less also. Persons who

are deprived of their natural rest, and take little food, suffer more from injuries than those who sleep their due proportion; and the temperate man often suffers but little from an injury, which will produce most distressing constitutional symptoms in an intemperate person.* The following cases are impressive,

* In persons addicted to the constant use of stimuli in large quantities, the natural powers of the constitution are so weakened, that they are not sufficient for the restoration of a severe injury, when the patient is altogether deprived of the stimuli; it is, therefore, necessary, in many of these cases, to allow them to be taken in moderation, to produce the proper action for repairing the injured part. This is well illustrated by the following cases, which also show the necessity and importance of a minute inquiry into the history of patients, previous to their coming under your care.

John Westrip æt 30, was admitted into St Thomas's Hospital on account of a severe injury to the elbow joint, caused by the wheels of a loaded coal wagon passing over the part. The nature and extent of injury were such, that I thought it advisable to amputate the limb. This was done about twenty hours after his admission into the hospital, as he would not submit to have it performed sooner. He was much intoxicated when the accident happened, but I could not get any information as to his previous history from the persons who came with him, for they had not been before acquainted with him. On the second day after the operation he had severe constitutional suffering; his pulse was very quick, his skin hot, his countenance anxious; the stump was much inflamed, and very painful: these symptoms rapidly increased, he became delirious, and the edges of the wound began to slough; the usual remedies were given to subdue the irritation, but without producing relief. On the evening of the day after he became delirious; I learnt from one of his friends who came to see him that he had been in the habit of taking ten or twelve pints of porter daily, besides spirits. I immediately sent for some porter, which he drank with great eagerness; and in the course of an hour after, he fell asleep. He slept several hours, and awoke perfectly composed and sane: the porter was continued daily, with a few ounces of wine; the sloughing of the stump stopped, and he rapidly recovered.

Charles Gordon, æt 40, applied at the surgery of St Thomas's Hospital for advice, on account of severe inflammation of the arm, which had arisen from a slight contused wound on the elbow. On examining the arm I found that inflammation of a phlegmonous character, attacking the cellular tissue, extended

showing the dreadful constitutional sufferings which occasionally result from slight local injury. Dr Ludlow, of Calne, pricked his hand with a thorn in shooting, and died of tetanus in a few days. I was called to see a young gentleman who had been thrown into a hedge, by which his hand was lacerated; in seven days he had symptoms of tetanus, and on the ninth day he died.

Case. — A man, who lived intemperately, was bled on Tuesday, by the late Mr Saunders; on the Wednesday he invited some friends to partake of a haunch of venison, of which he ate largely, and on the same evening drank a considerable quantity of wine; on the Thursday the party met again to finish the haunch; the patient indulged as freely on this day as on the former; this excess produced inflammation of the wound in the arm, which extended rapidly, and on the Saturday all the upper arm was in a highly inflamed state; gangrene commenced on the Sunday; on Monday I was asked to visit him; he was delirious, had hiccough, subsultus tendinum, and died on the Tuesday morning. When examined after death, a large portion of the integuments of the arm was found in a mortified state, with extensive suppuration in the cellular membrane; but the vein which had been opened was uninfamed.

from the carpus to the shoulder; this had produced excessive constitutional suffering; his tongue was very foul, his bowels affected with diarrhœa, his pulse very rapid, his countenance anxious, and his skin hot and dry. I had him immediately admitted into the hospital, and ordered medicines to allay the constitutional irritation, and to check the diarrhœa; nevertheless in the evening he became delirious. On the following morning I learnt that he had been accustomed to take considerable quantities of spirits daily; in consequence of which I directed he should have some gin (his favourite liquor.) Soon after taking the first quantity he became much more tranquil; it was, therefore, repeated, and produced as good effects as the porter in the former case. — T.

Case. — Another remarkable case occurred in a brewer's servant, who, in removing some casks on a Saturday, had a small splinter of wood forced under the thumb nail; at the moment he did not regard it, but the same night awoke in considerable pain, and requested his wife to rise and to make a poultice; this he applied, but it did not afford any relief; on Sunday he became worse; Tuesday his hand was much swollen, and the pain had extended up the arm; on Thursday I was requested to see him, and on examination found that matter was formed in the hand; I made an opening with a lancet near the part where the splinter had entered, when a large quantity of pus was discharged; the patient appeared much relieved; but upon hearing a noise as I was about to quit the room, I looked round: by a convulsive effort the man had raised himself in bed, but immediately fell back and expired.

Case. — An instance opposite to those just mentioned, is furnished in the case of another brewer's servant, showing how great an injury may be sustained without producing any violent constitutional irritation. The wheels of a dray passed over this man's arm, producing a compound fracture of the bones composing the elbow joint; the integuments were much lacerated, and an extensive wound communicated with the joint. The patient, who was admitted into Guy's Hospital, would not submit to have the arm amputated, although strongly urged to do so. The injured parts were, therefore, dressed by the surgeon, who was surprised at the man's speedy recovery, without any unfavourable symptoms: thus an injury, which in one person would be attended with the most dangerous effects, will in another produce little constitutional derangement; and the same person may at one period suffer but little from a wound, which at another time may give rise to fatal consequences:

thus many of the gentlemen who come from the country, for the purpose of following their professional studies at the London hospitals, on their arrival in the autumn have but little constitutional irritability, and would suffer but in a trifling degree from severe injury; but in the spring, after having spent a considerable portion of their time in the dissecting room, and in the wards of the hospital, constitutional irritation is easily excited, and an injury which in the autumn would not have produced any inconvenience, creates excessive constitutional suffering, and is perhaps attended with fatal effects. It is on this account that punctured wounds inflicted in the dissecting room, often produce such distressing effects; though it may, in some instances, arise from the absorption of morbid matter, which usually produces the most aggravated form of constitutional irritation. Gentlemen cannot, therefore, be too careful in the use of the dissecting instruments; as carelessness in this respect has, in some cases, occasioned the loss of several valuable lives, and in others tedious suffering, and irremediable defects in the limbs.

That the distressing and often fatal effects arising in many of these cases, depends more frequently on the state of constitution, than on the absorption of a morbid poison, is evident from their rare occurrence in the early part of the season, although perhaps more wounds are inflicted on account of the gentlemen not being so expert in the use of their instruments, from want of practice: it also frequently happens, that of several gentlemen occupied in dissecting the same subject, two or more may receive wounds, but only one suffer from constitutional irritation; or they may be affected in different degrees, as the following case will prove. A man having died in Guy's Hospital, from the effects of severe injury to the pelvis, by which one of the ilia had been

fractured, was removed after his death, by his friends, to Hackney. Permission being obtained to examine the body, my two apprentices, Mr Callaway and Mr Tyrrell, with a Mr Scott, then a dresser at Guy's Hospital, went to Hackney, at my desire, and inspected the body. During the examination, each of them received several wounds from the numerous spiculæ of fractured bone. A day or two after Mr Callaway had matter form in the theca of one of his fingers, which produced considerable constitutional suffering, and enlargement of the glands in the axilla; the abscess in the finger was opened, and with great care and attention to his general health, he recovered in a few weeks. Mr Tyrrell did not experience any inconvenience from the injuries he received; but Mr Scott, on the contrary, suffered from the most aggravated form of constitutional irritation: he had abscesses in the thecæ, of the tendons in the hand, and in the absorbent glands, at the elbow, and in the axilla; he was delirious for some days, and did not perfectly recover for many months, during which time he suffered extremely.*

Climate. — That warm climates increase irritability, and diminish the vital powers, is shown by the proneness to tetanus in such climes, and by the danger of operating on persons visiting this country, the

* There is much difference of opinion in respect to the origin of constitutional irritation in these cases, whether it arises from the absorption of poison, or from a previously deranged state of the constitution. Those who advocate the former opinion recommend the early application of escharotics, with a view to destroy the action of any morbid matter introduced into the wound. As far as my own experience goes, I believe the latter opinion to be correct, and therefore strongly condemn the use of caustics; the employment of which (if this opinion be correct), instead of preventing mischief, augments it, by increasing local affection. — T.

inflammation following them, often becoming erysipelatous; and the most simple sore frequently becoming irritable, and disposed to gangrene. Mr Elcock, a West Indian, pricked his finger in sewing up the body of a man recently dead: this was at twelve o'clock on a Monday; at night he spoke to me, when at Lecture, of a pain in his finger and arm; and I advised him to mention it to Dr Haighton, with whom he lived. On Tuesday he was in considerable pain, which extended up the arm, and he had high febrile symptoms. On Wednesday he was delirious, and died during Wednesday night, or early on Thursday morning.

Causes of death.—Injuries producing fatal consequences destroy life in three different modes. 1st. When slight, by keeping up a continued constitutional irritation, they gradually wear out the system. 2dly. When more severe, they destroy by occasioning excess of action. 3dly. The most severe, by shock to the nervous system, cause death, without reaction. Thus I have seen a person admitted into Guy's Hospital, who had a laden wagon pass over his knee: the bones were crushed, but there was no wound or hæmorrhage, yet the person died in a few hours after his admission. I have also seen a man, who fell into a vat of hot beer, by which both his lower extremities were scalded, but the body escaped any direct injury. This man's pulse was very small and feeble; his skin was cold; his teeth chattered; no reaction took place, and he died in eight hours, notwithstanding stimulants were freely given. I have known a limb amputated, for compound fracture, above knee, and the patient die in four hours after, without any reaction; the body was covered with a cold perspiration, and the pulse was scarcely perceptible.

Case.—I amputated a man's leg above the knee, in consequence of a shot through the upper part of

the tibia. During eight hours after the operation, the pulse was with difficulty perceptible; at ten hours it was 90, and very small; at 30 hours he was vomiting, and had no evacuation from the bowels, his belly was tense, the pulse was 114, and small: at fifty-four hours the pulse was 120; he was still vomiting; costiveness, and abdominal tension; no appetite, and his skin hot: at sixty-eight hours his pulse was feeble, and 140 in a minute; the tongue had a brown fur in the middle, and was white at its edge. He had still vomiting, costiveness, and delirium: at eighty-one hours he died. The stump was in part gangrenous, and in part had the appearance of an amputation, performed only a few minutes before.

Continued irritation.—Irritation in chronic diseases, or continued irritation, exhibits symptoms somewhat different. There is a chilliness succeeded by heat, sometimes once, at others twice, in twenty-four hours: the tongue has a white fur, or is unnaturally red and smooth, as if deprived of its cuticle; a loss of appetite, with occasional vomiting; an irregular state of the bowels, obstinate costiveness is succeeded by profuse diarrhoea; the urine is smaller in quantity than usual; the skin is sometimes hot, so as to be parched and dry; at others copious perspiration attends, especially during the night, so as to oblige the patient to change the linen in the morning; the pulse is quick, from 90 to 120 in a minute; the respiration is difficult and hurried, and often attended with a slight cough; the sleep is interrupted; the mind is irritable; and the patient is at length worn out, by an action which is exhausting, from its continued frequency, rather than its violence.

Dissection after death from irritation.—In dissecting those who die from irritation little is found to explain the cause of death. In children who die from scalds there is more blood than usual in the

vessels of the pia mater, and a greater determination of blood to the spinal marrow. In children dying from the irritation of teething, there is an effusion of from two to five ounces of water in the brain. In an adult dying from irritation, we have several times seen patches of cartilage and bone upon the pia mater of the spinal marrow.

Treatment. — The treatment of irritation being much the same as that required in inflammation, I shall give now but a short description of it.

Local. — When constitutional irritation arises from a local cause, the remedies must be chiefly directed to the source of the irritation; if possible, at once to remove it, or to lessen its effects on the constitution; but, on the contrary, when local disease is either promoted or aggravated by a deranged state of constitution; then the remedies must be in great part constitutional; for as the general health is improved, so will the local affection disappear.

Case. — A short time since, a case of compound fracture was taken into Guy's Hospital: in which at first nothing untoward occurred; but, after a short time, the patient's constitution suffered so severely, that his life was despaired of: a probe was passed into the wound, and a loose portion of bone was discovered pressing against the tibialis anticus muscle; the wound was dilated with a scalpel, and the detached portion of bone was extracted; immediately the constitutional irritation began to subside, he rapidly regained his former vigour, and was shortly discharged cured. Another patient was admitted into St Thomas's Hospital, for simple fracture at the upper part of the tibia, which was soon succeeded by violent irritation of the whole system, and formation of abscess at the seat of fracture. The limb was amputated in consequence, and, when examined afterwards, it was found that the tibia had been

broken into several small portions, which had been acting as extraneous bodies, and had caused all the local and general mischief: the patient quickly recovered from the operation. These cases are sufficient to show the necessity of seeking the cause of irritation, and the importance of its removal.

Constitutional. — Constitutional irritation must not be too suddenly subdued or entirely destroyed, as a certain degree of irritation evinces that nature is endeavouring to accomplish the restorative process; keep it therefore within bounds, carefully watch its progress, and, if necessary, check its violence, but do not entirely destroy it.

Means. — There are two means of reducing irritation.

Restoring the secretions. — First, by restoring the secretions of the different organs, and, by thus opening the outlets, lessen fever. A man who has his skin hot and dry, feeling excessively heated, if you can produce a free perspiration, will be immediately relieved and become cool. When the irritation is severe, you must not limit your medicine to act on any particular organ, but try to restore all the secretions; and this is best effected by administering mercurials to act on the liver, aperients on the intestines, diuretics on the kidneys, and antimonials on the skin.

Lessening the irritability. — The second mode of relieving irritation is by allaying the excitement of the nervous system; this can be effected by giving opium and antimony combined; or calomel, antimony, and opium, to act on the skin or liver as well as the nervous system: the latter is one of the best medicines for allaying irritation, and may be given to adults in doses of two grains of calomel, two of antimonial powder, and one grain of opium: to this you may add saline medicines, for they promote the secretions and lessen the irritability of the nervous system. Liquor

ammoniaë acetatis with tinctura opii, and the common saline with opium, soothe the system into peace. The alkalies, as potash and soda, diminish the irritable actions of organs, as may be seen in irritable bladder. Hyoscyamus and conium are also excellent remedies, especially in those persons with whom opium disagrees.

Bleeding. — The abstraction of blood lessens the momentum of the circulation, and prevents the danger of congestion in any of the vital organs; but it must be taken away with the greatest care, not to diminish too much the powers of the constitution. A man was taken into Guy's Hospital, having a concussion on the brain; the dresser, who admitted him, was a great admirer of venesection, and consequently bled the patient frequently, and in large quantities; in ten days the man died. On examining the head after death, a very slight laceration of the brain was discovered, but no attempt at restoration: the continued abstraction of blood had deprived nature of her restorative powers. In compound fractures it is extremely dangerous to bleed largely; as, by lessening the power of the constitution too much, there is not sufficient energy to perform the task of reparation.

If an important disease exist, nature will not always have power to perform the necessary duty of restoration. A man was admitted into St Thomas's Hospital, under Mr Cline, for a simple fracture of the os humeri; the fracture did not unite, and scarcely any inflammation arose: on the twenty-ninth day the man died suddenly. Upon dissection an aneurism was found in his aorta, which had burst: very little if any change had taken place in the fractured part.

Treatment of chronic irritation. — When there is chronic irritation, you can only restore the system to healthy action by slowly acting on the secretions; to

produce these diseases, some slow feverish action has existed, and some one of the secretions has been lessened; the skin is dry, or the bowels are costive; the bile is not properly secreted, or the urine is less abundant; hence the blood is locked in the system, and congestion, followed by inflammation, produces local diseases. The pil. hydrag. submur. comp. is the best remedy under these circumstances, as it increases the secretions of the liver, intestines, kidneys, and skin. The blue pill, or calomel, should be followed by an aperient in the morning, as they act on the liver, but not in proportion on the other secretions. To attempt to cure such diseases suddenly, or by violent and active means, must be ever improper; a chronic treatment is required, and by slow degrees only can you restore the body to a healthy state. Let me repeat, *all the secretions must be restored, as this is the grand principle in the cure of disease.*

On the influence of the Mind upon the Body.

The influence of the mind on some of the functions of the body, in a state of health, is well known: grief producing an immediate secretion from the lachrymal gland, as is evinced by a flow of tears; and fear occasioning an abundant secretion of urine, compelling the person to discharge it frequently; on some occasions, the same feeling produces a copious secretion of bile followed by jaundice. In disease, the influence of mental impression requires great circumspection on the part of the medical attendant. A tranquil or a cheerful state of mind, under accident or disease, greatly contributes to the patient's recovery; and those who are accustomed to witness a patient in the first few hours after he has received a severe injury, augur, from his manner,

the probability of recovery. If he submit himself to his fate without repining; if he yield himself to the advice of his friends, and readily consents to all that is proposed for his relief, he generally does well; but if, on the contrary, he bitterly laments his fate, or his mind is even too actively engaged in suggesting the means of relief, impatient in their not being immediately obtained, being officious in trying to assist, anticipating every desire, such a person has a degree of constitutional irritability highly unfavourable to his recovery. It is the surgeon's duty to tranquillize the temper, to beget cheerfulness, and to impart confidence of recovery. Some medical practitioners are so cold and cheerless as to damp every hope; whilst others inspire confidence of recovery, and a disregard of situation, which supports the regular performance of all the actions necessary for restoration. It is your duty, therefore, to support hope, to preserve tranquillity, and to inspire cheerfulness, even when you are still doubtful of the issue.

Grief. — Grief has great influence in producing disease, and in preventing recovery; it lowers the actions of the body, arrests the secretions, particularly that of the liver, and at length produces a slow feverish state. The two worst forms of disease to which the human form is liable (cancer and fungus) are frequently produced by grief and anxiety: how often have I known a mother watch her child in anxious suspense, under a long-continued disease; and although, at length, gratified with its recovery, has soon after perceived a tumour in her breast, which becomes the cause of her own destruction: on the other hand, a mother, bereft of all she dearly loved, under the grief arising from her loss, has an incurable disease produced, which soon terminates her life of sorrow. In the treatment of accidents,

grief often so depresses the system, as to destroy all the efforts of restoration.

Anger. — Anger has the effect, frequently, of disturbing the healthy actions of the body, and of retarding the progress to recovery. I was attending a man who had an ulcer, which I had several times brought to a healthy state; but, when I had given an opinion that it would soon be cured, I found, on the following day, when I saw the patient, that the sore was irritable and inflamed, and that I had my labour to begin again. This occurred several times; at length I was informed, that my patient was exposed, in his family, to sources of great mental irritation; I therefore directed him to take an apartment distant from the causes of angry excitement; and he then, under the same treatment, recovered without any further relapse.

Fear. — But fear has the greatest influence in destroying your best efforts to cure injuries or diseases. Often have I known patients declare, after an accident, that they were sure they should not recover; and they seemed to be deprived of all restorative power. Not long since, a person came to me from the country, and described his symptoms, which induced me to believe that he had a stone in his bladder: I sounded him and found a stone. When I informed him he had the stone, he said, ‘I hope not, for I can never submit to an operation.’ I prescribed some medicine for him, and he returned into the country, where he died in a few days after.

During the period of my residence with Mr Cline, a lady consulted him for a tumour in her breast, which he recommended to be removed. She said, she was sure that the operation would kill her; but it was observed, that the removal of such a tumour was generally attended with little danger. Although unwilling to submit, and strongly impressed with the

idea that the operation would be fatal in its issue, her friends prevailed upon her to consent: and, when I mention Mr Cline as the operator, it is unnecessary to say, that it was done with all that skill and caution could effect. She died on the same day, only an hour after the operation; and it was found, that she had arranged her family and domestic concerns in such a manner, that no confusion should arise from what she thought her inevitable doom.

Case. — A child, for some trifling offence, was put, by its school-mistress, into a dark cellar: the child was dreadfully frightened at the idea of being put there, and cried violently during the hour that it was confined. When she returned to her parents in the evening, she burst into tears, and begged that she might not be put into the cellar; the parents thought this extremely odd, and assured her that there was no danger of their being guilty of so great an act of cruelty; but it was difficult to pacify her, and when put to bed she passed a restless night. On the following day she had fever, during which she frequently exclaimed, ‘Do not put me in the cellar.’ The fourth day after, she was brought to my house in Broad Street, in a high state of fever, with delirium, frequently muttering, ‘Pray do not put me into the cellar!’ and when I inquired the reason, I found that the parents had learnt the punishment to which she had been subjected. I ordered what I conceived likely to relieve the fever, but the child died in a week after this unfeeling conduct.

The following is also a curious example, given in the words of a child, aged ten years. ‘I wanted to write my exercise, and to scrape my slate pencil, and went into the school in the dark to fetch my knife; when one of my school-fellows burst from behind the door, to frighten me. I was exceedingly

terrified, and it made my head ache. On the following day I became deaf; and, on the next, so deaf as not to hear the loudest talking.'

In this state she continued in June 1824, three months after having been frightened; at which time I saw her. She had been previously under the care of Mr Hodgson, of Birmingham.

LECTURE II.

ON INFLAMMATION.

The restorative principle. — INFLAMMATION is the means by which local injuries are repaired, and it may be therefore considered as the restorative principle. Its presence is usually indicated by the four following signs; viz. 1st, by an unnatural redness in the inflamed part; 2d, by pain; 3d, by increased heat; and, 4th, by swelling: these marks of inflammation admit of a very ready explanation.

Redness. — 1st. Redness: that this arises from an increased determination of the red particles of the blood into the part, may be distinctly seen, when inflammation is superficial, as in the tunica conjunctiva of the eye; and that it is the result of a dilated state of the vessels is readily ascertained by injecting parts, in which the vessels are naturally of small diameter, as the injection in inflammation easily passes into vessels, which would not before have received it; as, for example, by the injecting an inflamed peritoneum, pleura, or tendon, which is a part naturally possessing but little vascularity.

Sensibility. — 2d. Increased sensibility arises from the extension of the nerves, by the greater quantity of blood determined to them. Parts naturally endowed with little sensibility are quite the reverse when in a state of inflammation. I was called, a short time since, to a case in which it was necessary to saw off a small piece of the tibia, after a long-continued compound fracture; during the operation, a cavity was opened, in which was a small spicula of bone, embedded in a granulation: the latter was

extremely sensitive; the extract of belladonna was applied to it, and gave immediate relief: Indeed, bones, though nearly destitute of sensation in their healthy state, are sometimes extremely sensitive when inflamed.

The degree of suffering in an operation is greater or less according to the absence or presence of inflammation.

Not only is the sensibility of a part increased, but its irritability is exceedingly augmented by inflammation. If an hydrocele be injected when inflamed, it suppurates instead of adhering: and if amputation be performed through an inflamed part, the stump scarcely ever unites by the adhesive process, but passes into a suppurative, and sometimes a sloughing state. An intelligent surgeon, therefore, generally avoids cutting into an inflamed part, from the great pain which it inflicts, and from the restorative process being difficult, on account of the great irritability of the inflamed surfaces.

Heat. — 3d. Increased heat: — Mr Hunter denied this: he made an incision, two inches deep, in the gluteal muscles of an ass, and into the wound he introduced a tin canula, $1\frac{1}{2}$ inch long, so that there was half an inch of wound below the canula; he then passed a plug of wood through the canula to the bottom of the wound, and confined it there, so as to prevent an union of the muscles: this was on a Wednesday. Immediately after the wound was made, a thermometer was introduced into it, and the mercury rose to 100° exactly, as another did at the same time, which had been passed into the vagina. On the next morning the plug was taken out, and the ball of the thermometer introduced to the bottom of the wound; the mercury rose to 100° : the plug was then again returned, and secured as before. In the evening the experiment was

repeated with the same result. On Friday morning, the thermometer, when introduced, rose to 99° only; and, in the evening, it rose to $101\frac{1}{2}^{\circ}$. On Saturday morning, when introduced again, the mercury reached 99° : in the evening 100° .

Similar experiments were made on dogs, with the same results.

It appears also by Mr Hunter's experiments, that the temperature indicated by the thermometer, when inflammation was excited in the rectum or vagina of an ass or a dog, was not greater than that existing in an healthy state of those parts.

But although no increase of heat is evinced in internal inflammation, yet when the inflammation is seated on the surface of the body, in which the temperature varies much, and is below 98° , an alteration sometimes of seven degrees takes place; as on the inside of the thigh, on which a blister was applied, the thermometer rose to 90° , whilst on the inside of the opposite thigh it only reached 83° : in another instance it rose only 4° , but in every experiment the temperature was increased.

Swelling. — 4th. Swelling. — Is occasioned in part by an increased determination of blood to the diseased spot, distending the vessels; but it also depends on effusion of the fibrin of the blood, which, in coagulating, separates a serum into the surrounding cellular tissue.

Inflammation has four terminations.

Adhesion. — 1st. In adhesion. This arises from fibrin being thrown into the cellular membrane, and the parts becoming glued together by it. It had been supposed that it was albumen which was poured out in inflammation; but in examining this subject with care, it is found that the character of the effused substance, in all respects, resembles the fibrin of the blood, and by this substance are the edges of the divided parts reunited.

Suppuration. — 2d. Suppuration or secretion of pus. This is composed of particles nearly similar to those of the blood, only differing in colour, swimming in a fluid resembling serum, and coagulating, as serum does, when exposed to the influence of heat.

Ulceration. — 3d. Absorption or ulceration, which arises from an increased action of the absorbent vessels, produced by pressure united with inflammation, by which the constituent parts of the body become partially absorbed.

Gangrene. — The 4th effect is the destruction of the life of the inflamed part. From excessive action the arteries are first enfeebled, and then their vitality is destroyed; the blood coagulates in them, and gangrene of the part is produced.

Constitutional effects. — These are the local effects; and the constitutional, which accompany them, are the different symptoms of irritation mentioned in the preceding Lecture.

Inflammation of textures. — Inflammation produces different results, as it is seated in the various component parts of the body. When seated in the skin, it usually becomes extensive, because the surface is unbroken. Its colour is very florid; it separates the cuticle in the form of a vesication, which usually contains serum, but also, in some cases, fibrin; a serous effusion is also produced by it into the subjacent cellular tissue. In some instances, it is preceded by fever; in others, produces it. The skin is also liable to eruptions of various kinds; some acute, others chronic; some constitutional, others local only; some devoid of any infectious quality, others strongly possessing it.

Cellular membrane. — In the cellular membrane inflammation produces an effusion, which obliterates or fills its cells; if it proceeds, it occasions suppuration and produces an abscess, the contents of which

are discharged by the process of ulceration. In debilitated irritable constitutions, inflammation kills the cellular tissue, and produces carbuncle, which is a sloughy abscess in the cellular tissue: when chronic, it occasions tumours of various kinds, as the steatomatous or adipose; or, under peculiar circumstances, those of a malignant nature, as scirrhus, fungus, &c.

Fasciæ mistaken for erysipelas. — Inflammation of fasciæ is generally extensive, from the large surfaces they present; they are often seen inflamed in compound fracture, producing redness of the skin to a considerable distance, and it is a very unfavourable sign in this accident. When matter is produced by inflammation of this texture, and is seated under it, great irritative fever succeeds, until it be discharged; as, for example, in the palms of the hands or soles of the feet.

Muscles. — Muscles are known to be in a state of inflammation by the spasmodic twitchings which accompany it; for instance, in a few hours after a simple fracture, when the limb has been carefully adjusted, it becomes disturbed by involuntary convulsive catchings, occurring when the patient is going to sleep, or awaking from rest.

Tendons. — Tendons are apt to inflame to great extent. They do not easily inflame; but when they do, for example, in the finger, the fore arm swells, is red, and matter forms in the course of the tendon, which sloughs to its junction with the muscle, in some cases; but in all to a greater extent than the surrounding soft parts. Punctured wounds of tendons are apt to produce tetanus, more than wounds of other parts of the body. Matter formed under tendons burrows to a great extent, and produces violent irritation, as under the tendon of the occipito frontalis muscle, and under the covering of the temporalis.

Absorbent. — Inflammation in the absorbent vessels is marked by red lines being formed on the skin in the course of these vessels, from the skin participating in the inflammation, they form hard cords from the effusion which surrounds them, and knots are felt in these cords from the enlargement at their valves. Their glands generally partake of this inflammation, and both the vessels and the glands occasionally suppurate. They more frequently inflame from common irritation than from the absorption of poisons.

Arteries. — The arteries rarely inflame, excepting from wounds or ligatures. Inflammation in them sometimes extends even to the heart, when a ligature is applied on one of them in a person of bad constitution. I was present when Mr Cline opened the body of a man who had a ligature put on his femoral artery near the groin, and who died at the end of the second week from the operation. The internal surface of the artery was inflamed, as also that of the external and common iliacs; and the aorta had a florid redness on its inner surface, as far as the valves of the heart.

Case. — A man, whose leg I had amputated, had a low muttering delirium, in which he rose from his bed and stood on his remaining limb; great irritative fever followed, and, what I have generally observed in inflammation of the blood-vessels, pain in bending his different joints, from its changing its position of the vessels. He died; and when I opened his body I found suppuration in the artery, for the space of two inches, above the ligature on the femoral, and inflammation of the inner coat of the arteries, in the parts in which I examined them.

Veins. — Veins, inflamed from wounds, form hard and broad cords, extremely tender to the touch, and

if from bleeding, from the wounded part to the axilla. I have seen several patients die from this cause; and in the greater number the bleeding was required for dyspnœa. Upon examination, the inner coats of the veins are found adherent, and I have seen suppuration in the vein; and once an abscess in the longitudinal sinus of the dura mater (which is a vein in function), of which we have a beautiful specimen in the anatomical collection at St Thomas's Hospital. When veins inflame from ligatures, they generally do so more below the ligature than above it, and excessive distension, from the interruption to the return of the blood, seems to be the cause of this circumstance. I have seen several persons die from ligatures being put on one of their veins, and the appearances on dissection were excessive distension from accumulated blood below the ligature: adhesion above the ligature, and a red internal surface extending towards the heart.

Nerves.—Nerves are very rarely inflamed; but when it happens, the pain is excessive, and there is a tingling feel in the parts to which the nerve is distributed; but there is no redness of the skin, although great tenderness to the touch. Wounds of nerves, though dreadfully painful at the moment, are followed by little irritation. The wife of a medical gentleman was obliged to have the posterior tibial nerve divided, which I did in the presence of Mr White, surgeon to the Westminster Hospital, for a painful tumour on the nerve: although the operation was dreadfully painful, and the pain shot through the brain, spinal marrow, and the nerves proceeding from it, yet it did not affect the nerves of the grand sympathetic, immediately or remotely, or produce any serious irritative fever. I have also had occasion twice to remove portions of the sciatic nerve, and but little constitutional irritation followed. Se-

vere pain takes place sometimes in the course of the nerves; but whether it be from inflammation or not, I have not been able to ascertain by dissection. When the pain is excessive, it is called *tic douloureux*. I am inclined to believe that this disease is not inflammatory, from the stimulant nature of the remedies which are found most efficacious in it, as carbonate of iron, bark, and arsenic.*

Ligaments.—Ligaments, like tendons, are not very prone to inflammation in healthy constitutions; but the synovial membrane, which lines them, is highly so, and the inflammation has great tendency to the suppurative process. In scrofulous persons, the synovial surface becomes inflamed, and the ligament covering it thickens, so as to produce great enlargement of the joint.

Cartilages.—Cartilages in joints ulcerate from inflammation, and often become entirely destroyed.

Bones.—The bones being composed of a cartilaginous substance (like that which supplies the place of bone in the very young subject,) and of phosphate of lime, and the former having arteries, veins, and absorbents entering into its composition, is, like other parts of the body, liable to inflammation, which produces adhesion of bone to bone; and in fractures,

* I have seen an affection of a nerve very similar to *tic douloureux* produced from injury: it was in a French officer, who had been shot through the leg at the battle of Waterloo: the anterior tibial nerve was wounded, and after the part had cicatrized he became subject to excruciating pain in the course of the nerve to its sentient extremity, whenever he put the muscles in action by attempting to walk; or it might be produced by irritating the surface of the integuments immediately over the distribution of the nerve. Various forms of counter-irritation, and also different constitutional remedies were tried, without affording relief. He would not submit to excision of the diseased portion of nerve, and left Brussels still suffering severely from this affection. — T.

the adhesion or union of the broken portions : in suppurative inflammation, abscesses ; and by ulceration is the matter discharged : death, or mortification of bone, is also the frequent result of inflammation ; and the dead bone sloughs, or exfoliates, whilst new bone supplies the place of that which is removed, or is to be separated.

Membranes. — Exhalent membranes, when they inflame, are naturally disposed to adhere ; whilst mucous surfaces, under inflammation, pass into the suppurative inflammation. This circumstance was first clearly explained by Mr Hunter, and since has been dilated upon by Bichat.

Healthy inflammation. — Inflammation is healthy or unhealthy ; it has been too much regarded as a disease, for no wound can be repaired without inflammation ; even the little puncture, made by the lancet in bleeding, would inevitably destroy life if this salutary process did not prevent it. A slight inflammatory action throws upon the edges of the wound adhesive matter, by which they are permanently united and the divided parts closed. So, when a ligature is put upon an artery, unless inflammation supervened it could be of no use in preventing secondary bleeding ; the first thing nature does in this case is to form a clot of blood in that part of the vessel which has been tied, inflammatory action succeeds, adhesive matter is thrown out, and the clot of blood is united to the internal coats of the artery so as to prevent an hæmorrhage when the ligature separates. Should the constitution, however, be unhealthy, this process would not be completed ; and when the ligature separates, the person sometimes dies of hæmorrhage. Of this we have an excellent specimen in the collection, taken from the stump of a person who died of hæmorrhage. The clot within the vessel adheres to it on one side but not on the other. Inflammation in

a healthy constitution, is a *vis medicatrix naturæ*, established for the purpose of restoration; but the inflammation which arises without any obvious cause, is an evil without any corresponding advantage; it is of an unhealthy kind, and arises from an irritable constitution, and from the enfeebled state of the affected part.

Acute or chronic. — Inflammation is either acute or chronic. The first passes through its stages with rapidity, while the latter is exceedingly slow in its progress. The chronic is either the result of acute inflammation, or is owing to a peculiar state of constitution; as that which occurs in persons who have lived intemperately, or in those who have been exposed to excessive and laborious exertion, or who are the victims of anxiety and of disappointment.

Acute. — One of the best examples of acute inflammation is seen in the breast after lying-in; the adhesive stage is marked by hardness and pain. The suppurative, by irritative fever, fluctuation, and throbbing or pulsation; ulceration usually quickly succeeds, and the matter is soon discharged.

Chronic. — The termination of acute inflammation in chronic, is well seen in ophthalmia. When consulted in a case of this description, during the acute stage of inflammation, you will take away blood, both locally and generally. This may be done either by opening a vein in the arm, by the application of leeches to the *palpabræ*, or by opening the temporal artery, or arteries, which sometimes relieves from its free anastomoses with the ocular vessels.* The

* I have frequently observed, that the abstraction of considerable quantities of blood from the temporal artery, in cases of severe ophthalmia, has produced little or no relief. On mentioning this to other gentlemen who are in the habit of treating ophthalmic diseases, I found several of them had remarked the same circumstance, which may be accounted for in the following

local applications should be such as soothe and allay local irritation, for which purpose emollient and narcotic fomentations are most appropriate. When by such means the acute inflammation has been subdued, it frequently happens that the chronic begins. In the acute stage, our object was to decrease power, but now it is required to stimulate the vessels, to contract their diameters, to diminish the quantity of blood which has accumulated in them, and thus restore them to their natural state, and this is best effected by astringent and stimulating lotions; as the solutions of alum, sulphate of zinc, nitrate of silver, &c; and as the depletion necessary to check the acute form of the disease, may have produced general debility, medicines will be required to increase the tone of the stomach and to give vigour to the circulation.

Another example of chronic inflammation succeeding the acute may be witnessed in gonorrhœa; at first it is necessary to check the violent action in the vessels of the urethra, but you are afterwards obliged to excite action by giving the balsam of copaibæ; and frequently slight stimulating injections are employed in this stage of the disease.

Common or specific. — Inflammation is common or specific.

The first, with its terminations, has been already described, and is called healthy inflammation. But the second, or specific, is of a peculiar kind, and is always unhealthy.

manner: — The branch of the temporal artery generally opened is the frontal branch, which anastomoses with the superorbital; and the usual method of stopping the flow of blood is to divide the branch which has been punctured, thus the anastomosis is cut off; and the blood, which before passed off in part by the divided vessel, is thus determined to the affected organ. — T.

Specific. — In specific inflammation the vessels have a different action to the healthy; and thus, the fluids and solids which they produce have not the usual character.

There are two descriptions of specific inflammation; one produced by a peculiar condition of constitution, and the other by the application of a poison. Gout is an example of specific inflammation. If a man, for a length of time, yields to every kind of injurious excess, loading his stomach with food and wine, so as to weaken the digestive powers, he will probably excite what is called the gouty disposition; he experiences dreadful pain in one or more of his joints; severe inflammation appears, which terminates in the secretion of a matter, becoming solid, usually called chalk-stone; the name, however, is incorrect, as it has been proved by the analysis of Dr Wollaston to consist of uric acid and soda; consequently is now named urate of soda.

The formation of scirrhus, or cancer, is another example of specific inflammation, arising from a peculiar state of constitution. Let us suppose that two women receive each a blow on the breast, one with a healthy and vigorous constitution, and the other with a system worn down with care, anxiety, and disappointment, and in a constant state of chronic feverish excitement, in which the secretions are imperfectly performed, and is thus predisposed to the formation of cancer: in the first individual, the inflammation produced will be strictly healthy, going through its different stages, until the cure is accomplished; but in the other, owing to constitutional peculiarity, the same extent of injury will produce cancerous disease; an affection over which all remedies, hitherto tried, have little control, and extirpation is but an uncertain mode of relief. The fungous disease, called by Mr Hey fungus hæmatoides, and by

others named soft cancer, pulpy tumour, &c, is in some respects similar to the former in its cause, but different in the action of the part, and in the effusion by which it is followed.

But the best example of specific inflammation is scrofulous. Persons subject to this peculiar form of inflammation have generally very fair complexions, and delicate appearance; this state of constitution is engrafted at birth; and when inflammation occurs, it is slow in its progress, although easily excited; and the result is sometimes a secretion of curdy matter; at others, of a thin serous fluid, resembling but little the pus which is formed in healthy inflammation.

From poison. — The second kind of specific inflammation is that which is produced by the application of poisons. Thus, in gonorrhœa, the matter secreted is widely different from common healthy matter, having a large quantity of mucus mixed with it; and, secondly, when applied to another mucous surface, it is capable of exciting an action by which similar matter and the same effects are produced. The matter of small pox occasions similar results. As far as constitutional effects are concerned, it does not seem to be essential in what quantity the poison is applied; the result in each case will depend upon the state of the constitution.

Irritable Inflammation. — There is another kind of inflammation, which I would call the irritable; in this disorder the blood-vessels are much less affected than the nerves. You are called to attend a person, who tells you that he feels in the hand, arm, or some other part, most agonizing pain: if not experienced in these matters, you will be inclined to doubt the correctness of your patient's statement, as you cannot discover any diseased appearance of the part. Some time ago I was consulted by a lady who had this painful affection in the foot, and I employed va-

rious remedies without her being relieved: finding no improvement, and suffering in health, she went to the coast, and there used a steam bath; and, without any further means, the pain quickly subsided. The eyes are very subject to this torturing disorder. But no part is more frequently attacked by it than the breasts of young women. It produces such a degree of tenderness, that they cannot bear the slightest pressure: the pain extends to the shoulder, down the arm, and even to the elbow and fingers, accompanied by constitutional irritation. To cure these pains, and general derangement, such medicines must be given as will influence the secretions, but especially that of the uterus. This irritable inflammation sometimes attacks the testicles, rendering them extremely sensitive, so that the patient can scarcely sustain the pressure of his clothes. It is attended with little increase in the size of the gland. I have been obliged to remove the testicle in three persons for this disease. The subject of one of these operations was a gentleman from South Carolina: he came to England for advice, and consulted many of the surgeons in London, but without experiencing any relief of his sufferings, from the various remedies they advised. He at length requested me to remove the torturing part; this I did, and he returned to his native country quite well. The bladder is also occasionally disordered by this irritable inflammation, and the symptoms, in many respects, resemble those of stone; in both cases there is pain in making water, and blood is sometimes mixed with the urine. The grand difference in these two cases is this: the irritable bladder is most painful when distended; that which contains a stone, when emptied. On dissection, the inner coat of an irritable bladder has been seen the colour of red velvet. I have known this irritable inflamma-

tion attack the rectum, and produce excessive suffering, which was relieved by large doses of soda. — Soda, rhubarb, and the compound powder of ipecacuanha, are the best remedies.

Cause of inflammation. — Inflammation sometimes arises from debility, and this state is frequently seen in the lower extremities of old persons in whom the blood returns to the heart with difficulty; from weakened power, the arteries are called upon for unusual exertion, and inflammation of the skin succeeds, frequently attended with incrustations and a serous discharge, and sometimes with a watery secretion into the cellular texture.

An irritable constitution is most prone to inflammation; and, when produced in it, is more dangerous and extensive. Some persons are naturally irritable, others become so from disease. Thus, in fever, when the constitution has suffered much, the parts on which the body rests become inflamed and mortify. But in fractures, where the system is healthy and vigorous, although the patient remains many weeks in bed, no such effects are produced. Where there is great irritability, inflammation is always dangerous; the application of a blister to the chest of a child, for the removal of a cough after measles, frequently, in this town, destroys life, by producing gangrene. So mercury, by rendering the body irritable, disposes it to inflammation; and it is wrong to operate on a patient immediately after a mercurial course on account of this inflammatory tendency.*

Exciting causes. — The exciting causes of inflamma-

* A young woman in our Hospital, who had passed through a course of mercury, had a fatty tumour removed, and died of erysipelatous inflammation, brought on by this simple operation. A man had a musket ball extracted from his arm whilst under a course of mercury, and had severe erysipelas produced in consequence.

tion are, whatever produces an unnatural state of a part, calling upon nature for its reparation, which it effects by the process of inflammation; as bruises, cuts, pressure, extraneous substances, &c. The manner in which nature repairs these injuries will hereafter be more particularly described.

The proximate cause of inflammation.—The state of the blood does not tend to the production of inflammation; and the opinions formerly entertained of the increased thickness of this fluid in inflammation are now known to be diametrically opposed to the fact, as the blood is rendered more than usually fluid by it.

If a part which is the subject of inflammation be examined, the following are the appearances which I observe:

The tail of the tadpole is the best transparent part of an animal for making these observations: in the web of the frog's foot the vessels are less conspicuous. When the tail of the tadpole is placed under the microscope, a surface appears intersected by rivulets of blood, in which the red particles may be seen rolling on in a most beautiful current. The part is now irritated either by slightly wounding it, or by the application of an acid; almost immediately the velocity of the circulation appears to be increased; in a few minutes little branches of vessels appear to be growing out of the sides of those before visible, into the transparent part; these vessels are now seen receiving a red particle, or particles of blood, which gradually advance in them, forced forwards by a vis-a-tergo, until they reach the beginning of the corresponding vein; and then this vessel being larger than the artery, the red particles rush from the artery into it, and thus a new vessel appears to be created under the eye. It is not, however, a new vessel, but a serous artery, which, by

the force of the action of the heart and of the surrounding vessels, becomes dilated, so as to receive red particles. When the red particles are observed in the vessel, they seem to advance by the pulsation of the heart, and then slightly to retreat; but not in proportion to their advance, and thus they gradually proceed.

The vessels of the inflamed part, on this account, appear to become more numerous; but it is only that they can now be seen from the difference of the fluid which they contain. They become very considerably dilated, and they seem disposed rather to yield than to contract. This is what can be with certainty observed in these animals.

With respect to man, we observe, that if a drop of nitric acid be applied on any part of the body, in three or four minutes a rush of blood takes place into the part, and it becomes red. In the parts near to that inflamed, a strong feeling of pulsation is produced, showing that the action of the surrounding vessels is increased; and the heart, sympathising with it, has the velocity and force of its action augmented.

The vessels of the inflamed part then are found to be dilated, but the arteries feeding the inflamed part are also dilated; so that if a limb be injected, in which there has been any considerable extent of inflammation, the principal vessels, as well as their branches, have their diameters increased.

Inflammation is, therefore, a dilated state of the vessels of the part, an increased action of those in the surrounding parts, and the heart sympathising with the part determines a larger quantity of blood to the dilated vessels.

Illustration. — This process may be illustrated by what is frequently occurring in the organ of vision; a piece of iron lodges upon the eye, and becomes a

source of irritation. A flow of tears is produced by the increased action of the lachrymal gland to wash away the cause of irritation. So an irritation upon other parts of the body leads to the determination of blood to the part, to remove by subsequent processes the irritating cause.

LECTURE III.

TREATMENT OF INFLAMMATION.

THIS is either constitutional, local, or both combined.

When any important organ is directly injured, or its functions disturbed in consequence of the influence of the injury upon the constitution, the treatment must be necessarily constitutional. No vital organ can be deranged in its functions, without producing a general disturbance in the system; and this will be greater or less, in proportion to the importance of the part injured, the extent of the injury, and the nature of the person's constitution.

Bleeding.—The most powerful constitutional means of relieving inflammation is, by the abstraction of blood. Its beneficial effects principally result from its producing a diminution of nervous power; and that it does so, is proved by the syncope which it occasions. Sometimes the removal of a very small quantity of blood will occasion not only suspension of all the voluntary functions, but of the mental powers.

Its modus operandi.—Fainting, however, cannot be easily produced, unless the patient be in the erect or sitting position whilst the blood is abstracted; for it is the loss of this fluid by the vessels of the brain, which is the immediate cause of fainting. To prove this, when a person faints, place him in a recumbent position, and let his head be situated a little lower than his body, to facilitate the passage of the blood to the brain, and in a very short time after being

thus placed he will open his eyes, and all his faculties will return.

The second mode by which bleeding relieves, is by lessening the momentum of the circulation; for when there is great distension of the blood vessels, the momentum will be necessarily great, and consequently the vital fluid will be thrown with great force, not only on the inflamed part, but on all the organs of the body.

Indication for bleeding. — The indication for general bleeding is a hard pulse. In this state of pulse the diameter of the vessel is diminished, yet its action is exceedingly strong, and each pulsation feels like the vibration of a wire; therefore, when you find this description of pulse, you will be justified in taking away blood. The hardest pulse is that which is produced by inflammation of the heart; in inflammation of the lungs and of the brain the pulse is hard, but not equally so with that which arises from inflammation of the heart.

When the stomach or intestines are inflamed, the pulse is hard, but is often so small as to be scarcely distinguishable. Persons unacquainted with this fact are afraid to take away blood, although it is imperiously required, on account of the paleness, depression of strength, and smallness of pulse; as, for instance, in strangulated hernia. This observation also applies to peritoneal inflammation.

Quickness of pulse is not in itself a sufficient proof that bleeding is required; but when united with hardness, no additional evidence of its necessity can be wanted; therefore do not bleed when there is a quick pulse, unless, at the same time, it is hard; for a quick pulse is in itself a proof of irritability, which bleeding will increase.

The indication for a repetition of bleeding is said to be a buffy state of the blood; but your decision

must not be governed by this appearance alone, for you must still have regard to the pulse.

When blood is cupped or hollowed upon its surface, it is said to be a proof of inflammation, and that bleeding should be repeated; but the following case will show, that even a cupped state of the blood, and buff conjoined with it, are not sufficient evidence that venesection may be repeated. A patient in Guy's Hospital, in the last stage of scurvy, whose blood vessels were so weak, that a slight pressure on the skin produced ecchymosis, whose gums frequently bled, and whose pulse was exceedingly quick and feeble, had a very small quantity of blood taken from his arm as an experiment; after standing for a few hours, it became not only buffy, but considerably cupped. I had this blood preserved, on account of the commonly supposed inflamed appearance; but the blood will be buffy, and lose its red particles, in coagulating, from quickness of action only: when you contemplate a repetition of blood-letting, it may be of importance to keep this observation in your remembrance. If the quantity of serum be very large, unless there are other indications for bleeding, this circumstance is an evidence against the repetition of blood-letting.

Quantity taken away. — The quantity of blood usually taken away at one time in inflammation, in an adult, may be from ten to twenty ounces; but must vary with the degree of inflammation, the importance of the organ inflamed, and the state of the constitution.

When compared with the solids, the quantity of blood which can be drawn from an animal, before it dies, is about one part to sixteen. A small dog, weighing fourteen pounds, had its jugular vein opened; from this eleven ounces were discharged when the dog fainted; the carotid artery was then divid-

ed, and from this source three ounces more were obtained, and no more could be drawn. Thus fourteen ounces of blood were removed from a dog weighing fourteen pounds; so that one ounce of blood to one pound of solids, was the proportion drawn.

Mode of bleeding.—When you bleed to relieve inflammation, the blood should be abstracted as rapidly as possible; therefore, the orifice made into the vessel should be of considerable size; for if allowed to flow slowly, the vessels have time to accommodate themselves to the diminished volume of circulating fluid; so that the system feels but little the gradual abstraction of blood. The grand object is, to produce a tendency to fainting, and in some cases complete syncope; to effect which, blood must be suddenly withdrawn. But in very delicate persons the loss of a small quantity of blood will subdue inflammation: a gentleman who has been for many years subject to inflammation in his lungs, is usually relieved by the loss of six or eight ounces of blood.

Case.—You may bleed, so as to produce constitutional and local effects at the same time. A patient of Mr Forster's in Guy's Hospital, who had concussion of the brain, suffered afterwards continued pain in his head, and had considerable constitutional irritation; blood was abstracted from the external jugular vein, and immediately the pain in the head ceased, and did not afterwards return.

When you are required to take charge of patients suffering from an injury, which demands a length of time for its restoration, you must be exceedingly careful how you take away blood from the system generally, but must in preference adopt local bleeding; for if, as I have observed, you adopt a system of free depletion, nature will not be equal to the

restoration of the injured parts, and the most disastrous consequences follow the indiscriminate employment of blood-letting. There is not a greater error than this in the practice of surgery.*

Secretions restored.—The second mode of relieving inflammation, is by restoring the secretions; for whenever inflammation occurs, at least in a violent degree, all the secretions are diminished or suppressed. The most important secretions are those of the liver, intestines, skin, and kidneys; and when these cease to perform their proper functions, irritative fever is the consequence. A deficiency of secretion from the alimentary canal is the cause of a great number of the diseases to which human beings are subject. The internal surface of the intestines is lined by glands; the tube itself is on an average twenty-seven feet in length, and three inches at least in circumference; so there are here near one thousand inches of surface, from which, in health, continual secretion proceeds. What, then, must be the result of allowing so extensive a secreting surface to remain inactive? the production and continuance of constitutional irritation. To excite the intestinal canal, and to restore its action, is, therefore, one of your principal objects: this may be done by purgatives. Purgatives afford relief in nearly the same manner as the abstraction of blood from the arm; for a pint of serum will pass off with the fæces, after taking a brisk cathartic.

* A stout man was admitted into Guy's Hospital, having a simple fracture of the tibia, with considerable contusion of the surrounding parts; a day or two after his admission, he had severe constitutional irritation, and acute pain, with spasmodic action of the muscles near the seat of injury. To relieve these symptoms, the dresser was directed to take some blood from the arm of the patient, which he did; but thinking it proper that faintness should be produced, as a proof of its effect on the constitution, and forgetting that the patient was in a recumbent position, he abstracted so large a quantity of blood, that all power of restoration was completely annihilated, and the man died. — T.

Purgatives have likewise another excellent influence, independently of restoring the intestinal secretions, by carrying off whatever fæculent matter is lodged in the intestines; but I do not believe that much irritation is produced by the accumulation of fæces, in comparison with that which originates from the secretions being arrested. I have met with several cases, in which an almost incredible quantity of fæces had collected, yet it produced but little constitutional irritation. Accoucheurs frequently witness similar cases. In one instance which fell under my observation, the pressure was so violent, that it produced ulceration into the vagina; yet the enormous quantity of fæculent substance excited but little constitutional irritation; some fluid formed a passage by the condensed mass, and was daily discharged; this, in a great measure, accounts for the absence of irritative fever.

That it is from the check to secretion, that irritative fever arises, is proved by what occurs in children during dentition; they are sometimes put to bed quite well, yet in the morning an arm, leg, or both legs, are paralyzed, from the irritation of a tooth, the secretion from the intestines stops, fever is excited, and produces a hot and dry skin; but restore these secretions by administering purgatives and antimonials, and the irritative fever quickly subsides, although the paralysis will sometimes continue with little alteration for life.

There is another mode in which purgatives produce a beneficial effect in inflammation, by irritating the intestines; blood is determined to them, and it is abstracted from the part inflamed; upon the acknowledged principle, that two increased actions proceed, with difficulty, in the body at the same time.

Action on the liver. — It is of little use to produce

action in the intestines, unless you also excite the secretion of the liver; therefore, give mercurials with your saline medicines, as these produce secretion of bile: do not give saline aperients alone, which act chiefly upon the intestines; the best plan is, to administer some mercurial medicine at night, and a purge in the morning. An excellent purge for an adult is, one grain of calomel with four of cathartic extract, or two grains of blue pill, with three of extr: col: comp: castor oil may also be recommended; and as another safe opening medicine, you may prescribe — Infus. sennæ with magnes. sulphas.

In children, calomel with rhubarb, scammony, or antimony, may be ordered as aperients; and in addition to these means the use of injections and the warm bath are the best means of restoring the secretions of the digestive organs. An old Scotch physician, for whom I had a great respect, and whom I frequently met professionally in the city, used to say, as we were entering the patient's room together, 'Weel, Mister Cooper, we ha' only twa things to keep in meend, and they'll searve us for here and herea'ter; one is always to have the fear of the Laird before our ees, that 'ill do for herea'ter; and the t'other is to keep your boeels open, and that will do for here.'

Mode of preserving health. — The means by which I preserve my own health are, temperance, early rising, and spunging my body every morning with cold water, a practice I have pursued for thirty years; and though I go from this heated theatre into the squares of the Hospital, in the severest winter nights, with merely silk stockings on my legs, yet I scarcely ever have a cold; should it happen, however, that I feel indisposed, my remedy is one grain of calomel combined with four of cathartic extract, which I take at night, and a basin of hot

tea, about two hours before I rise the following morning, to excite a free perspiration, and my indisposition soon subsides.

Perspiration.—The next secretion we should endeavour to restore, for the purpose of relieving inflammation, is that of the skin, for it rarely happens that a hard pulse continues with a free secretion from the surface of the body. It operates by evacuation of the serous parts of the blood, and by determining blood to the surface, removes it from the inflamed parts.

The best mode of producing perspiration, to which bleeding and aperient medicines greatly conduce, is by administering the antimonial powder, with diluents; or the compound ipecacuanha powder (Dover's powder); the latter is apt to produce costiveness, therefore the antimonials are the best. Antimonials appear to act with more certainty when given in conjunction with small doses of mercury: calomel and antimony, with the exhibition of the warm bath, either partially or generally, will in most cases produce the desired effect.

Urinary secretion.—The other secretion, that of the kidneys, may be restored by giving diluents, squills, or acetate of potash.

When, after bleeding and administering aperients, the inflammation is not reduced, but the pain increases, and the pulse acquires a jerking or palpitating feel; do not bleed again generally, but give calomel and the compound powder of ipecacuanha to lessen the nervous irritability, and to open the intestinal and cutaneous pores. I had thrice bled a very irritable patient on account of an inflammation of the testicle, yet the pain increased, and the artery at the wrist was raised with a jerk at each pulsation; he was quickly relieved by taking Dover's powder with calomel. The inflammation in such cases is supported by the irritability of the system.

Nausea.—There is another mode of subduing inflammation, by giving a solution of tartar emetic, in small doses, so as to create a constant state of nausea. This plan is often successful in croup; but calomel is also to be occasionally administered.

When inflammation occurs in old people, you must bleed with the greatest caution. An elderly lady, having inflamed lungs, was ordered to be bled; the bleeding was repeated, and effusion into the cellular texture of the legs soon followed. Digitalis was prescribed for her, combined with spir. æther nitric. which reduced the inflammation, occasioned the absorption of the fluid in the legs, and she rapidly recovered.

The means, therefore, which are employed to lessen or remove inflammation are those which restore the secretions, by opening the extremities of the arteries; and thus the heart is prevented from propelling the blood with violence to any particular part of the body.

The Treatment of chronic Inflammation.

The remedies employed, in this case, must have a slow and gradual action on the secretions. You cannot take this disease by storm; and if your medicines act with violence, you will produce mischief instead of affording relief. The principle on which this disease is founded, is the arrest of some of the secretions; and its successful treatment depends upon their restoration.

Chronic inflammation is frequently produced through the influence of the mind on the body; thus long-continued grief will stop the secretion of the bile; anxiety of mind produces disease in the breasts. But whatever is the cause of the arrest of secretion, some congestion is the result; as enlargement of the

liver, of glands, or of joints; the formation of common tumours, or those of a specific character, as fungus or scirrhus.

In disease of a chronic kind, give calomel and opium; and I cannot point out to you a better example of its good effects than is observable in chronic inflammation of the joints, or testicle; in the former cases, when assisted by counter-irritation, it is by far the best remedy. The most common medicine, and probably, as a general one, the best that is administered in chronic inflammation, is the pilul. hydrarg. submur. comp.: it acts at the same time on the liver, intestines, and skin; and if you can succeed in restoring their secretions, the disease will disappear, and its effects will be absorbed; for, by these medicines, in proportion as you increase the secretions, you excite the action of the absorbent vessels.

Another excellent medicine, for the cure of chronic complaints, is the oxymuriate of mercury (corrosive sublimate), dissolved in nitrous æther, and combined with tincture of bark or of rhubarb, or with the decoction of sarsaparilla; continue it for some time, watching its effects with care, always keeping in mind that mercury, given to excess, will tend to increase rather than destroy constitutional irritation; as sarsaparilla seems to possess the power of lessening irritability, we frequently give it with mercury, and in this combination they are administered with the greatest advantage.

Chronic inflammation in children. — Chronic disorders in children require small doses of the dydrarg. c̄ cretâ and rhubarb mixed together, and given every night and morning; this compound is exceedingly mild, and will have a particularly benign influence. In children also, one grain of the oxymuriate of mercury, dissolved in an ounce of tincture of bark, and given in doses of from half a drachm to one drachm,

twice a day, in water, according to the age and constitution of the child, is a very valuable medicine. It is said, that the oxymuriate is decomposed by the tincture of bark; but whether it is so or not, it is attended with so many good effects, that I strongly recommend it, particularly in diseases of the mesenteric glands. Calomel and rhubarb, the hydrargyrus c̄ cretâ and soda, are also medicines of much power in the chronic diseases of children.

Lastly, in some cases, it is not advisable to give these little creatures mercury; a medicine composed of rhubarb and carbonate of iron, or of rhubarb, soda, and calumba, given often and in small doses, will be more beneficial, as these act as aperients, improve the digestive functions, increase the appetite, and restore the general health, without the danger of exciting irritation at the moment, or rendering the system afterwards irritable.

The local Treatment of Inflammation.

The nature of inflammation having been explained; and it being understood that the vessels of the part are in a dilated state, and that those surrounding it have an increased action, I shall now speak of the local remedies. Of the application of cold to an inflamed part, as a means of checking the violence of the inflammation, or of altogether subduing it, much has been said. Cold is not a positive quality, but the abstraction of heat in inflammation affords much relief. If cold be applied to the body generally, it has the power of lessening the frequency of the pulse in an extraordinary degree. I tried this upon myself: I went out of my house one severely cold evening, when I was very warm, my pulse being 86°; at the expiration of an hour it was 76°, and at the end of an hour more it was reduced to 65°; it

had not only lessened in quickness but in fulness. Cold will produce torpor of body and mind, by diminishing the excitability of the nervous system: in extreme, it occasions death.

Anecdote.—A curious instance of this kind occurred in Nova Scotia; Dr Scott had been dining with some friends, a short distance from Halifax, and they were on their return home at night, when one of the party separated from the rest, having said to a companion that he would frighten some of them by-and-by. However, they reached Halifax without seeing any thing more of him on the journey, and he had not arrived: at this the party became alarmed, and returned for the purpose of finding him; he was discovered behind a hillock of snow, apparently asleep, in the erect position, but quite dead.

Anecdote.—Another circumstance of this kind is related in Cook's Voyages; when some of the officers and crew of one of the ships landed at Terra del Fuego. Dr Solander, who was one of the party, particularly cautioned them not to go to sleep, stating that it was extremely dangerous to do so in very cold situations. It happened, however, that the Dr himself became drowsy, and it was with the greatest difficulty that his companions could keep him in motion; and it was only by extraordinary perseverance that they succeeded in getting him back to the ship alive.

Cold therefore, applied generally and gradually for a length of time to a healthy person, diminishes the power of the nervous system, and has the effect of lessening arterial action, both in force and frequency.

When cold is applied locally to an inflamed part, it robs it of its heat, lessens its nervous energy, and diminishes the diameter of the vessels; it must be severe if it reduces the temperature of internal parts

below 98°; but in this climate many parts of the body, remote from the source of circulation, vary in temperature from 20° to 30°: thus, a thermometer applied to the toes when they are cold, will be found to indicate 20° less of heat than when it is applied to the calf of the leg. Cold applied to excess destroys life by the great abstraction of heat, heat being necessary in a certain degree for the support of the vital actions.

Thus, in the living body you may apply cold to a part until it becomes actually frozen. Mr Cline and Mr Sharpe were once attending a patient who had a strangulated hernia; to assist the reduction of which they applied ice, enclosed in cloths, and this they continued for thirty-six hours; as the ice dissolved, the parts became completely frozen; proper applications thawed and restored them to life; but inflammation and slight gangrene succeeded: the hernia, however, was reduced, and the man eventually did well.

It frequently happens in more northern climes, during severe winters, that the lobes of the ears and tips of the noses of those who are exposed to the weather will become frozen; they may be restored to life again by rubbing them with snow, the friction restoring circulation, whilst the heat is moderated by the application.*

* Mortification of the toes, or of a considerable portion of one or both of the lower extremities, is not an uncommon consequence of exposure to severely cold weather, especially if the person be debilitated, and the action of the heart feeble.

In the winter of 1822, Andrew Tangilon, a Swede, was admitted into St Thomas's Hospital, on account of mortification of both feet, from exposure to excessive cold, in the Baltic. He had been living for some time on salt provision, to which he was not accustomed. Separation of the mortified parts had commenced when he was brought to the Hospital, and he was in a state of extreme debility. By giving him nutrition and gener-

One of the best lotions that can be applied to an inflamed part, for producing cold, is composed of one ounce of rectified spirits of wine and five ounces of water. Goulard water is also much extolled for reducing inflammation and lessening pain; but when applied too long, or when containing a large quantity of lead, it has been known to destroy nervous irritability in too great a degree. Mr Forster, of Guy's Hospital, saw a person in whom the upper eyelid became completely paralyzed from its improper application.

In applying the spirit of wine in solution, let the linen be fine, and put lightly on the inflamed part, that evaporation may go on with facility; as it is by the abstraction of heat during evaporation that the good effects are produced.

Do not put ice itself to the inflamed part; it irritates and is apt to produce gangrene. Some years since, when I was making a series of physiological experiments, I wished to ascertain what effects would be produced on the pulse by the sudden application of severe cold, for which purpose I plunged my bare arm up to the shoulder into snow; immediately before the immersion the pulse was 80°, and it quickly rose, when immersed, to 109°; this result was contrary to what I expected, and I repeated the experiment. The pulse sometimes did not rise so high, but was small and hard. The exposure to so great a degree of cold caused severe pain, and consequently was a source of irritation.

However, in deep-seated inflammation, as in that of the brain, and in determination of blood to the

ous diet, his health rapidly improved, and I afterwards amputated both the legs below the knee, at an interval of twelve days. He perfectly recovered, and now works at Mr Hanbury's refined sugar manufactory, on the Commercial Road. — T.

head, the application of ice to the scalp is of signal service.

Effects of the cold bath. — The experiment I have related led me to an examination of the principles of the action of cold bath; and I found, that when a person in health takes a cold bath, not being accustomed to it, it produces irritation, and sometimes renders the pulse irregular: but, on the contrary, when a person in a state of irritability and weakness, with a feeling of heat about him, goes into a cold bath, it tranquillizes the nervous system, and therefore is beneficial. It absorbs the superfluous heat, lessens nervous irritability, and reduces the pulse, when quickened, nearly to its natural standard.

I had injured my health by being too much in the dissecting room, and I discharged a considerable quantity of blood from my stomach, and fever was the consequence. In this condition I went into the country for the benefit of a pure atmosphere; and I there had frequent opportunity of noticing the influence of cold on an irritable pulse, in my own person: before a fire my pulse would be at 120° ; but on going into the cold air, it sank in a short time to 100° ; and, by a longer continuance in the cold, it became still less frequent. When my pulse was quick and irritable, and my skin was heated, if I used a cold bath in the morning, on that day my pulse was slower, and the superfluous heat was removed; so that the body was much cooler than in the preceding day, or on the succeeding day, when the bath was not used. Thus, where there is great irritability of the nervous system, and where the heart is sending the blood with accelerated motion through the different channels, cold will prove invigorating, by lessening the first of these affections, and reducing the latter to the natural standard.

The manner, therefore, in which cold relieves in-

flammation, when locally applied, is by abstracting heat, by lessening the diameters of the vessels, and by diminishing nervous irritability.

Heat and moisture. — The next mode of relieving inflammation by local remedies is by the application of heat, with moisture; this appears like contradiction; apparently, opposite causes are used to produce the same effect, and it seems to be blowing hot and cold with the same breath; but it is not so. The application of heat alone would be injurious, by increasing action; but, when combined with moisture, it is beneficial, by producing relaxation, opening the cutaneous pores, and giving rise to perspiration; thereby removing congestion, and producing nearly similar effects to those which arise from the application of blisters. The effects of heat and moisture combined are well exemplified by what happens when a person takes a warm bath; for instance, a person, whose pulse is at 75° , places himself in a bath, the water of which is heated to 100° ; his pulse soon rises to 100° ; presently he perspires freely, his pulse becomes less frequent, but soft; great relaxation follows, and, if he were not removed, he would faint, so great is the exhaustion that it occasions. Here then is a direct proof of what heat and moisture produce, when applied generally; and when used locally, the effect on the part is precisely the same.

Fomentations are ordered on the same principle, to relax the secreting extremities of the vessels, and produce perspiration of the surrounding parts; by which tension is removed, and pain consequently abated. I do not think that medicated fomentations are preferable to mere warm water, unless the integuments be broken. With respect to poultices, they are used with the same views; to excite relaxation, and to produce secretion; the kind of poul-

tice is of little consequence if the integument be sound.*

Local bleeding by leeches. — The next method of relieving inflammation is, by the application of leeches: by abstracting blood from the vessels of the part, they lessen their diameters, and consequently diminish their distention and force of action; they take away but little blood during the time they remain on the part, but considerable quantities will flow from the wounds made by them; if heat and moisture be applied immediately they fall off, as they prevent the formation of coagula, by which the wounds would otherwise become closed.

To some persons, and in some situations, however, the application of leeches is attended with very great inconvenience;† as for example, when the testis is inflamed, it is of considerable importance to some persons that bleeding from this part should be concealed; in such a case, to avoid the inconvenience of the application of leeches, and the exposure consequent on the after bleeding, it is better to

* Even when the integument is sound, I believe anodyne fomentations or poultices to be of considerable service in alleviating local irritation; and have known patients experience much benefit from their use, when common poultices have been applied without affording relief. If the iris can be affected by the application of belladonna to the eyebrow, or if preparations of lead are beneficial in inflammation when the surface is not broken, why may not anodynes allay irritation? — T.

† In many persons, when leeches are applied, they cause a kind of erysipelatous inflammation, rarely of a dangerous nature, but producing considerable inconvenience and disfigurement. In such cases they afford little or no relief, and, therefore, should never be used.

If applied over parts which contain much loose cellular tissue, as the palpebræ, or the scrotum, an ecchymosis is a frequent consequence: this is a great objection to their being used to the exterior of the palpebræ in persons who are particular about their appearance. — T.

puncture some of the distended vessels on the scrotum with a lancet, keeping the patient in the erect position; you may in this way get away any quantity of blood you wish; and what is of great consequence you can stop the bleeding when you please, by placing the patient in a recumbent position, and applying some linen, dipped in cold water, over the punctures, which become quickly closed. In deep seated inflammation, blood should also be removed by cupping.

Treatment. — I shall now describe the local treatment of chronic inflammation.

In the acute inflammation, the object is to decrease vascular action; but in the chronic we endeavour to strengthen and change it. Thus in long continued discharges, arising from relaxation, we endeavour to restore the vessels to their healthy power of contraction, by employing astringent and stimulating lotions, — as in chronic ophthalmia we apply solutions of alum, of the sulphates of zinc or copper, and of the nitrate of silver, &c; in chronic affections of the skin, we use lime water and calomel, or the oxymuriate of mercury, &c. Gonorrhœa, as I have already mentioned, is an excellent example of the difference between acute and chronic inflammation, and of the principles upon which the opposite treatment is founded; at first you diminish action, but afterwards stimulate to promote contraction of the dilated vessels.

When you apply stimulating lotions, you should cover the parts with oil silk to prevent evaporation, by which cold would be produced, and your intention frustrated. The object being to excite heat and action, the prevention of evaporation materially assists; and as the perspiration, as well as the vapour from the lotions, condense on the inner surface of the oil silk, it keeps the parts constantly moist,

which is very advantageous, as it enables you to remove the applications without disturbing or injuring the new formed skin. When this covering is not used, the linen over the wound soon becomes dry, and adheres to the newly-formed granulations and skin; consequently, when you remove this linen, the granulation and skin are much injured, and in this manner the progress which nature has made in restoration during twenty-four hours, may be defeated in a single minute.

Counter irritation.—The next method of treatment is by counter irritation. The mode in which this acts, is by creating a new inflammation near to the part diseased; the surrounding vessels are immediately put in action to assist in the support of this new inflammation, and consequently blood is abstracted from the neighbouring part in which the disease previously existed: thus a blister at the nape of the neck, if early applied, will stop an inflammation in the brain; a blister at the scrobiculus cordis will frequently check inflammation in the stomach; an irritating lotion applied to the scrotum will often cure an inflammation of the testicle. It is curious to observe, that still a similar advantage is derived from counter irritation in parts that have no immediate connexion. In inflammation of the lungs, a blister applied on the chest (parts between which there is no direct communication) will assist in checking the disease; blisters on the forepart of the abdomen are very beneficial in inflammation of the liver, intestines, &c.

Blisters are more frequently used for exciting counter irritation than any other means. Issues and setons are sometimes adopted; they were formerly much employed as counter irritants; but they often produce too much, and also irritative fever, and thus add to the original malady they were intended to

subdue. Counter irritants must never disturb the constitution. Sometimes after a blister has been removed, it may be necessary to keep up the irritation and discharge; to accomplish this, the cuticle which has been raised by the blister must be removed, and the exposed surface dressed with the savine ointment.*

Another mode of producing counter irritation is by rubbing on the part tartarized antimony in combination with oil or lard. This is a very excellent method, and is now generally adopted. You must be careful, however, on what part you apply it, if you intend to excite irritation in a great degree, as it is likely to blemish the skin. I saw a young lady, who had used it on the arm for a chronic affection of the elbow joint; she was much offended with her medical attendant, for recommending its employment, as it had left a scar on the part.†

Position.—The next circumstance to be attended to in the treatment of inflammation is position. Although the human body is not to be considered as an hydraulic machine, yet the fluids are in some measure governed by the laws of gravity. Look at the operation that I spoke of before, for relieving inflammation of the testicle; the vessels of the scro-

* In some persons the employment of cantharides to produce counter irritation, occasions considerable irritation of the urinary organs, amounting, in some cases, to strangury: this more frequently happens, when the cantharides are applied with a view to promote discharge from a raw surface. — T.

† A mode of producing counter irritation, very common on the Continent, is by the application of moxa: one end of a roll of cotton (which has been dipped in a solution of nitrate of potash, and dried again) is lighted, the other end is placed to the part on which it is wished to produce irritation, and kept there until the whole is consumed. I have seen this operation performed several times, but I do not think it at all preferable to the other modes which are in common use. — T.

tum are punctured, and if the patient be in an erect position, the blood will flow freely; but put him in the recumbent posture, the stream will immediately cease.

If the hand or fore arm be the seat of inflammation, the limb should be placed on an inclined plane, by which the hand and elbow may be raised higher than the shoulder, as in thecal abscess of the fingers or hand, and in acute inflammation of the elbow joint, &c. It is equally necessary to attend to the position in inflammation of the leg. I will give you an example.—I was sent for to see a gentleman farmer, in the neighbourhood of Rayleigh, in Essex, who for a long time had been subject to a very severe inflammation in both his legs; they were of a very dark red colour, much swollen, and gangrene was threatened in them; the constitutional irritation was great, and his tongue covered with a brown fur: when I saw him, his legs were resting in a tub of cold water, and on his taking them out they smoked. I had him immediately placed on a sofa, and contrived to rest his legs upon one of its ends, so as to raise them much higher than his body; the vessels soon began to unload themselves, and in a short time the redness of the skin was much lessened; I then applied flannels, which had been dipped in tepid water, and afterwards in warm water; this produced a free perspiration, by which the skin became unloaded; the swelling and pain consequently diminished. He gradually recovered, and in six weeks was enabled to ride a considerable distance. It would be absurd to attempt to cure extensive inflammation in a limb, if it were allowed to remain in a depending posture.

Rest.—During the cure of inflammation, rest is absolutely necessary: all of you must have observed, that exercise increases the action of the heart and arteries, and would therefore be very injurious in

inflammation. When a joint is inflamed, it is one of the grand principles in treatment, and no good can be done without it: it is curious to observe how nature herself endeavours to obtain this state; for where a joint is diseased, the muscles of the limb have in a great degree lost their power; thus, if a man has inflammation of the wrist, elbow, or shoulder joints, and you place your hand in his, desiring him to squeeze yours, you find that he cannot do so, or that the attempt is exceedingly feeble. In inflammation of the joints in the lower extremities, the muscles of the part in like manner lose their rigour.

Indurations. — Indurations frequently remain after inflammation has entirely ceased; these are removed by the following means, which produce absorption.

Pressure. — Pressure has the power of exciting the action of the absorbents in an extraordinary degree, and you may apply it either by the use of rollers, or strips of plaster.*

Electricity. — Electricity too is attended by similar effects, strongly exciting the action of the absorbents.

Mercury. — Mercury does the same, and much more decidedly than the other remedies I have men-

* When it is necessary to apply pressure to any part of an extremity, it is best to commence from the end, as the fingers or toes, otherwise partial pressure, by preventing a return of the blood by the veins, creates effusion and inflammation, and sometimes mortification.

A sergeant, belonging to an infantry regiment, was shot through the leg at the battle of Waterloo; some considerable hæmorrhage followed, to stop which one of his comrades tied a narrow bandage tight over the openings; he remained several days in the neighbourhood of Waterloo, without having any medical assistance; and although his leg had been excessively painful, and was swelled considerably, he was afraid to remove the bandage for fear of bleeding. When he was brought into the hospital at Brussels, gangrene had commenced, and he was obliged to submit to have the limb amputated. -- T.

tioned. Thus, when a man dies in our foul wards, in a state of salivation, we find that the alveolar processes, and gums, have in part been removed by absorption.*

Friction. — Friction has of late years been much employed for the cure of indurated and stiffened joints, consequent on inflammation; it was recommended by the late Mr Grovesnor, of Oxford. This remedy was his hobby, and, like all other hobbies, it occasionally carried its rider into the mire; for Mr Grovesnor sometimes recommended friction before inflammation had sufficiently subsided, consequently it produced mischief; in many instances, however, when judiciously employed, the best results are effected. A gentleman, in the neighbourhood of Nottingham, when shooting, received a severe injury to his knee: after the violence of the first inflammatory symptoms was over, there remained considerable swelling, stiffness, and induration; for these he was attended by Mr Attenborough, an eminent surgeon, of Nottingham: as the gentleman did not rapidly improve, Mr A sent him to town, and he remained for a length of time here under my care; still the joint continued in the same state; I advised him to go to Oxford, and consult Mr Grovesnor. This he did, and as soon as Mr G. saw him, and found that his limb had been kept quiet, he told him to walk to the bottom of Christ Church meadow, and return to him, which the gentleman really did. Friction was used in this case with the great-

* In severe cases of iritis, in which lymph has been deposited on the surface of the iris, the influence of mercury, in promoting the action of the absorbents, is distinctly and beautifully shown. I have seen many cases in which the lymph occupied as much as one half of the anterior chamber; yet, after mercurial action had been excited, and kept up for a few days, the lymph had entirely disappeared. — T.

est success; for within six weeks from the time he went to Oxford, he called on me in town, quite recovered, to thank me for my recommendation to Mr Grovesnor.

Friction accelerates circulation and absorption; and the way in which Mr Grovesnor recommended it to be done was by applying both hands to the joints, at the same time alternately moving them up and down.

Case. — The late Mr Hey, of Leeds, a man whose mind was free from every paltry prejudice, most eminent in his profession, and ever anxious for its improvement, had a son who met with a serious injury on the ankle joint; after trying all he could to relieve him, without success, he sent him to Mr Grovesnor; and, under his care, by judicious application of friction, the actions of the joint were completely restored.

In cases of violence done to joints, when the inflammation has been subdued, which it will be in a month or six weeks, friction and motion are very useful: but in chronic diseases of joints, many months of rest will often be required before inflammation has sufficiently subsided to allow of friction and motion being safely used to prevent ankylosis.

LECTURE IV.

ON THE ADHESIVE INFLAMMATION.

FOR a knowledge of this process, we are indebted to that bright luminary of our profession, the late Mr John Hunter.

Adhesive inflammation is the process by which divided parts become united.

Effects of inflammation of the blood.—Inflammation has a disposition to separate the blood into its constituent parts: for when blood is drawn from a healthy person, it separates into serum and red particles only; but in a state of inflammation, if, after it has been drawn in a free stream, it be allowed to remain undisturbed, it separates into serum, red particles, and fibrin. The red particles, with some fibrin, will be collected together at the bottom of the vessel; and the greater part of the fibrin, separated from the red particles, forms a yellow surface on the crassamentum, or what is called the buff of the blood, and the serum will occupy the surrounding space. The coagulation of the blood is slower than usual, and the red particles are precipitated, so that the fibrin, having lost the red particles, contracts with great firmness, and, when separated, it resembles a piece of leather. It has been said, that the adhesive matter is albumen; but it has been proved not to be so. Dr Bostock, who lectured on chemistry several years at Guy's Hospital, took great pains to investigate its nature, and published on the subject. Mr Dowler made many experiments for the same purpose, and found it to be decidedly fibrin. Mr Hunter called it coagulated lymph: this certainly

was not a very appropriate term. I shall call it adhesive matter from its effect in inflammation, and by which fibrin is to be understood.

On the membranes.—Some of the exhalent surfaces of the body naturally secrete a watery fluid, and are called serous; while others, separate mucus. The cellular membrane is one of the former, and exhales a fluid somewhat resembling serum; it contains much less albumen. This membrane is prone to the adhesive inflammation. The vessels which usually secrete the fluid just mentioned, pour out fibrin under inflammation, and which, becoming coagulated, produces the hardness that we usually find in inflamed parts.

On the peritoneum.—The membrane which doubly covers the intestines (the peritoneum) is a serous surface, often affected by the adhesive inflammation, which occasions the two surfaces of this membrane to be firmly glued together.

On the pleura.—But the part of all others which is the most subject to this kind of inflammation is the pleura; and we rarely open a body of the adult without finding on the surfaces of this membrane some unnatural adhesions.

On the pericardium and dura mater.—The heart, in like manner, is often glued to the pericardium, so that its cavity is sometimes obliterated. And in the membranes of the brain we frequently meet with partial adhesions between the dura mater and tunica arachnoides.

Thus, then, it will be seen that the serous membranes readily assume the adhesive inflammation, by which they become permanently united to each other, or to the adjacent parts; this is a most beautiful and wise provision of nature; for if the membranes of cavities, such as the pleura and peritoneum, instead of the adhesive were to produce the suppu-

rative inflammation, effusion and death would be the frequent consequences; for example, matter would be often formed in the cavity of the pleura, and empyema would generally destroy.

On the urethra. — The urethra is generally affected by the suppurative inflammation. This is another of nature's benevolent and wise ordinances; had the outlets of our bodies been subject to the ready production of adhesion, they would have become closed and life destroyed. Sometimes, where inflammation of the mucous membrane of the urethra is exceedingly violent, it passes into the adhesive stage, glues the parts together, produces retention of urine, and unless the person were relieved by an operation, the disease would end in the destruction of life. I witnessed the following curious example of this circumstance: a kangaroo was brought to me for dissection, from Exeter Change; its bed of straw had caught fire, and, although it was very soon extinguished, the animal died; and the proprietor, knowing that it had not been severely burnt, was at a loss to account for its death. Upon examination, the bladder was excessively distended with urine, and it was retained in consequence of the closure of the urethra by the adhesive inflammation; the penis having been injured by the fire, the inflammation that followed was violent, and, being adhesive, closed the urethra. Thus you may perceive that common gonorrhœa would destroy life if the urethra were not so constructed that its membrane is more readily affected by the suppurative than by the adhesive inflammation.

Trachea. — When inflammation attacks the air tube, it usually happens that the mucus, which it secretes, becomes purulent; but in very violent inflammation, adhesive matter is effused, and produces the disease which is called croup. If the larynx be the

seat of this disease, it frequently destroys life; but when the inflammation is seated in one of the bronchiæ, the adhesive matter is coughed up, in an arborescent form, and the patient recovers.

Nature of adhesive matter. — When an incision is made into a part which has been affected by the adhesive inflammation, viz, the cellular membrane, a quantity of serum is found effused around the inflamed part; and in the part itself, a yellow and semi-transparent substance, having the appearance of jelly, though different in its nature. The best opportunity of witnessing the adhesive inflammation, is on the skin, under the irritation of a blister; the blister produces the same effects as those occasioned by the operation for hydrocele. Let a blister be applied for twenty-four hours, till the cuticle be raised; then make an incision into the vesicle, and a quantity of serum will escape: here, your observation generally terminates; but examine the surface, and you will find on it a yellow substance, which will in a greater or less degree exist, according to the length of time the blister has been applied; also on its severity, and the irritability of the skin, but, generally under the application of a blister, adhesive matter is effused, as under adhesive inflammation.

Time required for production of adhesion. — To those who are anxious to know the time required before the commencement of adhesive inflammation, it may be proper to state, that it is different according to the structure of the part and nature of the constitution. In the cavity of the abdomen, the intestines will be glued together in nineteen hours after the adhesive inflammation has begun. I mention nineteen hours, because I have seen it produced in that time in a case of gun-shot wound. It may be in the recollection of some of you, that a Mr Blight was shot by a man of the name of Patch, in the

neighbourhood of Deptford; the ball traversed the abdomen: I was called to this case, and Mr Blight died nineteen hours after he had received the shot. I had an opportunity of seeing what I have just mentioned; the intestines were glued to each other, and to the peritoneum; the surface of which had much adhesive matter on it.

On other wounds the process of adhesion takes place rapidly; for if a piece of lint be applied to a recent wound, in twelve hours it will be glued firmly to the surface: in a dog the adhesive process commences in six hours.

Adhesive matter, when effused in a thin membrane, coagulates in a net-work, assuming the character of cellular membrane.

Adhesive matter becomes organized. — When adhesive matter has been formed, blood vessels soon enter it, and within a short time it becomes organized; the vasa vasorum are elongated, by the force of circulation, and enter the newly formed substance, sending out minute ramifications. On cutting into adhesive matter within twenty-four hours after it has been deposited, small bloody spots may be seen, marking the future situation of the vessels which nourish it; but it is not till ten days after it has been formed that any considerable portion of adhesive matter becomes entirely organized; for if injected, you will not completely succeed through every part of the newly formed substance until ten days after the injury, and not even so soon in certain structures.*

* Mr Hunter relates a case in which the adhesive matter, effused in inflammation, had become organized in twenty-nine hours. He operated on a man for strangulated hernia, and the patient died twenty-nine hours after the operation. On examination of the body, he found some adhesive matter (which did not exist at the time the operation was performed) deposited on the portion of intestine which had been strangulated; very fine

When vessels elongate, they have not the character of arteries in general; they take a serpentine and tortuous course.

It has been thought that the new vessels originated in the effused substance; but they are formed by the elongation of the vasa vasorum of the surrounding arteries, which become dilated, lengthened, and serpentine, and the degree of vascularity will be in proportion to that of the part subjected to the adhesive process. In tendons, for instance, it will be much less than in muscles.

Use of the adhesive inflammation:—This process is of the greatest possible importance in surgery. It ought, therefore, to command much of your attention; and it will be unfortunate for you if you do not understand it. Without this process no operation could be attended with success: its absence, even after bleeding, would destroy life. Bear this principle in mind, endeavour to effect union by adhesion. You have seen, during this present winter, a man admitted into Guy's Hospital with a compound fracture, which was rendered simple by applying lint dipped in blood, and in a fortnight all danger from the accident was dissipated.

In compound fracture:—Suppose you were called to a compound fracture, what would you do? Endeavour, certainly, by bringing the parts together, to make it simple fracture. Within these few days you have had an opportunity of witnessing the fatal consequences of hæmorrhage in a case of compound fracture; but if the adhesive process had taken place, hæmorrhage would have been prevented, constitutional irritation lessened, and recovery rendered almost sure.

injection of different colours was thrown into the arteries and veins of the gut, which also filled the new-formed vessels in the adhesive matter, rendering them perfectly distinct.—T.

In operations. — It is the same in formidable operations. The Cæsarean section, which consists in making an incision in the course of the linea alba, for the purpose of extracting a fœtus from the womb, is not dangerous, if the adhesive process takes place. Its advantage may be exemplified by the operation for cataract: in this operation a wound is made in the eye, more than half of the cornea is cut, the adhesive process begins within twelve hours, and in twenty-four the edges of the wound are consolidated. Suppose, on the contrary, they do not adhere, violent inflammation supervenes, and the result is destruction to the eye of the patient by suppuration: the success of the operation depends then on the adhesive process. In a person who has been in ill health, the inflammation may be too weak, and in another case it might be too strong; suppuration would be the consequence in both instances: thus the same effect results, though produced by very different causes. Again, in the operation for strangulated hernia, an opening is made into the hernial sac, which communicates with the cavity of the abdomen; and if the parts are not afterwards united by the adhesive process, the patient dies.

In the operation for aneurism, it is the adhesive inflammation which saves life; a ligature is applied to the artery, a coagulum of blood forms, the adhesive process commences, fibrin is poured out, and the internal coats of the artery are glued together; but for this circumstance, when the ligature separates, hæmorrhage will certainly ensue.

In the operation for the radical cure of hydrocele, we have an excellent opportunity of witnessing the effects of adhesive inflammation. After the water has been evacuated, a stimulating injection being thrown into the cavity, excites upon its sides an irritation; inflammation is set up, adhesive matter is

thrown out, the internal surface of the cavity generally becomes permanently united, and thus a radical cure is effected. If an incision be required to be made into the tunica vaginalis, whilst it is suffering from the adhesive inflammation, its cavity is found filled with a substance which has the appearance of jelly.

The treatment of a stump after amputation will best exemplify this subject. In amputating a limb, your first object is to preserve sufficient integuments to cover the ends of the bone; it should be integument and not muscles, which cover the end of the bone; for if muscles are brought with the integument over the bone, they will contract, and retraction of the skin covering the stump will be the result. When the limb has been removed, you will apply ligatures to the bleeding vessels; now I would not advise you to tie every small vessel; ligatures on the principal vessels are quite sufficient, and the fewer you apply the better; for though it is very desirable to prevent disturbance of the limb on account of hæmorrhage, yet by waiting a short time after the operation, the bleeding from the smaller arteries will generally stop.*

* During an operation, especially in winter, the patient becomes chilled, or if a considerable quantity of blood has been lost, he becomes faint. In either case the blood will not flow from vessels, which may afford a very free hæmorrhage, when the patient gets warm in bed, or reaction takes place. Independent of the mischief which must result from opening an extensive wound to take up these vessels, at a time that the adhesive process is probably going on, the patient's life is often endangered by the after bleeding.

The plan I usually adopt is as follows: after the larger vessels have been secured by ligatures, I bring the edges of the wound together by one or two strips of plaster, and then have the patient put to bed; and when the pulse indicates that the heart and arteries are again acting with their proper vigour, if there be any fresh hæmorrhage, the vessels are secured; the part is cleansed from coagula, and the dressing is completed.

This practice is, I believe, generally pursued in the army, and also by many hospital surgeons; and is particularly appli-

The ligatures themselves should be small, and consist of fine silk; for nothing is worse in operations than the application of coarse ligatures, excepting perhaps in cases of ossification of the arteries, when it would be justifiable; with this exception only, it is the worst possible surgery to apply thick ligatures to arteries.

Now there are two reasons why small ligatures are preferable: 1st, because they are less liable to escape from the artery; 2d, they divide the internal coats of the arteries more effectually: when you use a very fine ligature, the internal coats will be divided, and the external will remain entire. My friend Dr. Jones published an excellent work on the means by which arteries unite in cases in which they have been divided, or ligatures applied upon them; and he first stated the fact of the internal coats of the artery being divided by the application of fine ligatures; and that they consequently would more readily adhere from their surfaces having been broken. Thick ligatures prevent the wounds from healing so rapidly as thin, and they are upon that account objectionable. After the vessels have been secured, the sponge should be applied, and all coagula of blood be removed, as this is very essential to the union of the part; blood is not the means but the prevention of union in such cases; for unless it be removed, the adhesive inflammation will not produce its desired effect. There is one instance in which blood favours the process of adhesion, and that is in the application of a ligature on a blood vessel; for a clot of blood forms in the artery, and is

cable in the after treatment of those persons who have undergone operations for the removal of diseased *mammæ*, or for the excision of a testicle; in the latter case, there is most frequently a secondary hæmorrhage, if the wound is closed immediately after the operation. — T.

afterwards glued to its interior by the adhesive inflammation: with this exception, the opinion of blood producing the process of adhesion, is to be banished from your minds, for there are two modes by which union is effected; viz, by adhesion and by granulation; therefore, remove all clots of blood, which will only act as extraneous bodies, and keep up irritation. You are to cut off one end of the ligature close to the vessel, and let the other hang from the wound: it has been recommended to remove both ends of the ligature close to the vessel; this plan has, however, been already abandoned. It was, I have understood, determined by John Hunter, in the first operation he performed for aneurism on the trunk of the artery above the tumour; for in that instance he cut the ligature close to the knots, and copious suppuration occurred when it separated. Ligatures can only be removed from vessels by suppuration or absorption (in the latter case they must be first dissolved, and then removed by the absorbents); and conceiving that if a ligature, composed of a substance easily soluble, were applied to a vessel, and cut close to the knot, it might be dissolved and then absorbed, I applied a catgut ligature to the femoral artery of an old man upon whom I operated for popliteal aneurism, and cut it close to the vessel; this case succeeded, for adhesion followed, and suppuration did not ensue.

Although successful here, I have tried it in several cases since, and have not been able in any to prevent suppuration. I applied a silk ligature to the carotid of a dog on one side, and a catgut to the carotid of the opposite side. Upon killing the dog some days afterwards, I found the second ligature (catgut) buried in a cyst, and that the first had ulcerated the artery, and advanced to the side of the larynx by a process of ulceration. Experiment and observation

show that it is the best plan to cut one end of the ligature off, and to leave the other hanging from the wound, to be removed when the ulcerative progress is completed, which is from ten to fourteen days. Dr Veitch, I believe, first advised the removal of half the ligature.

After amputation, having disposed your ligatures in a line with each other, and leaving them to hang out at the most depending part of the wound, you will, if the limb be removed above the elbow or knee, apply a roller to prevent retraction and separation of the muscles and extensive suppuration. I have seldom succeeded, to my satisfaction, with my stumps above the knee without a roller; it is better to apply a roller in such cases, for the muscles will then be glued together, and form one consolidated mass. Having applied a roller, and brought the integuments together, I merely put three strips of adhesive plaster over the wound, and two round the stump, to keep the ends of the plaster in their place. It is curious to see the difference between the mode of dressing stumps now, and that adopted a few years ago. The old practice was, after the adhesive plaster had been applied, to put some lint, then plaster again, after that tow, and lastly, over the whole, a cap of flannel. If a surgeon were to do this now, he would be laughed out of the operating theatre; and very deservedly, because he would prevent the success of the adhesive process by undue heat in the limb.

All that it is necessary to do is, to use three strips of plaster over the wound, and one circular piece; if the weather be hot, to apply spirit of wine and water; and if cool, to keep the limb quiet. The object is, to prevent the inflammation passing beyond the adhesive stage; for then suppuration must be the result.

The last circumstance necessary to mention is, the impropriety of dressing the stump too early; a surgeon, anxious to see if union has been produced, removes the plasters from the wound in two or three days: he who does this, entirely overlooks the object in view and must be shocked, when he observes that the early removal of the plasters has destroyed all that nature had done. You ought, in four days after the operation, to remove one strip of plaster, for the purpose of letting out any matter which might have collected. In six or eight days after the operation, it will be proper to dress the stump, and then to re-apply a strip of plaster before you remove the whole of the first dressing.

This treatment, which is applicable to stumps, is proper also for common wounds; so that these are the principles by which you are to be directed.

The adhesive process is useful in the formation of cysts. Balls encysted, have been known to remain in the body for many years. Morgagni, if I rightly recollect, mentions a case, in which he found a ball lodged in the cyst in the lungs. You see by this preparation how complete is the cyst, and being little irritable, the ball remains in a quiescent state for the rest of life. If the ball be not encysted, it travels, by absorption of the parts through which it passes.

Another very important use of adhesive inflammation is, that of its dividing cavities into distinct parts by which means it fixes a boundary to the suppurative process; thus the cavity of the abdomen becomes divided into two, by the effusion of adhesive matter on the surface of the colon, by which it is glued to the peritoneum. In abscesses a cyst is formed by the adhesive process round the matter, and prevents its escape into the surrounding cellular tissue.

The advantage of adhesive inflammation is admirably shown in wounds in the joints. So soon as the knee joint is opened the synovia escapes, the person feels faint, looks pale, and the constitution appears to have received a severe shock. The wound endangers the loss of the limb and of the life of the patient, as the surgeon treats it judiciously or erroneously. If a poultice be applied to such a wound, or fomentations be used, a suppurative inflammation will follow on the synovial surface; the cartilages become absorbed, and the bones ulcerated; a profuse discharge ensues; the constitution becomes extremely irritated; chills, succeeded by burning heat, and profuse perspiration, frequently follow each other; and a person, just previously in the finest health, is precipitated into a state of extreme emaciation. Sometimes the joint, after weeks or even months have elapsed, gradually heals by granulation, with entire loss of motion, or a great diminution of it.

If, on the contrary, the surgeon brings the edges of the wound immediately together, and takes advantage of the adhesive inflammation to close the wound, the patient escapes from local or constitutional irritation, and in a fortnight is free from danger, and has scarcely suffered from the injury. He effects this object by bringing the edges of the wound together, by a fine suture, a plan to which some surgeons object; but when the wound is direct into the joint, it secures best the safety of the patient, as the secretion of synovia has a constant tendency to prevent adhesion, and to separate the plaster. Let the suture penetrate the skin only, avoiding the ligament; apply a piece of lint over it wetted in the patient's blood, and strips of adhesive plaster over the lint. A roller is to be gently bound round the knee, and to be kept constantly wet with the liq. plumb. acet. \bar{c} spir. vini; and a splint is to be placed behind the joint to preserve perfect rest.

In cases in which the constitution is destitute of vigour, the adhesive inflammation is sometimes so deficient, that immense abscesses are formed from their not being bounded by adhesion; and I recollect having seen in a poor hypochondriac the back nearly covered by an abscess to which adhesion had not formed bounds.

In hare-lip it is by the adhesive inflammation the wound becomes united, and the horrible deformity is removed.

The effusion of adhesive matter, by unloading the vessels of the part, has the effect of reducing the inflammation; so that the process generally terminates as soon as this effect is produced.

The great facility with which many of the soft parts unite by adhesion, has led to the application of this principle for the reparation or restoration of some portions which have been destroyed by disease, or designedly mutilated.

In the East Indies, where it is the practice of many of the chiefs to cut off the noses of their prisoners, an operation is frequently, and in most cases, successfully performed, to make a new nose. Mr Carpue has performed some successful operations of the same nature in this country, and the mode of conducting them has been well described by him.

My Lynn has made a new under lip, by bringing the skin from beneath the chin.

I have made a new portion of urethra from the skin of the scrotum, and Mr Earle has performed a similar operation with success.

Occasionally some small portions of the soft parts, which had been completely separated from the body, have again united: many curious cases are on record; but I shall speak more at length on this subject in the Lecture on Wounds.

LECTURE V.

ON SUPPURATION.

Definition.—SUPPURATION is the formation of purulent matter from the orifices of the blood vessels; and the fluid so produced is called pus.

Purulent matter is formed either from the exhalent vessels of natural surfaces, when inflamed, or in cavities formed in the body by an ulcerative or absorbent process as in abscesses, or from granulating surfaces.

Constitutional symptoms of suppuration.—Rigors, succeeded by heat, attended with a quick and hard pulse, and with other symptoms of constitutional irritation, generally precede the formation of matter in acute abscesses.

When matter is formed upon the natural surfaces of the body, which are connected with organs of vital importance, much irritation, and disturbance, attend it; but when matter is produced upon wounded surfaces not important to life, or upon parts of little vital importance, then it is often formed without an irritative fever preceding it.

Whilst the rigor occurs, the blood is collected in the large vessels in the vicinity of the heart, and in the heart itself. Torpor of the nervous system, coldness of the surface, and diminution of the powers of volition occur, and irregular actions of the muscles are produced. But the congestion of blood in the heart soon excites it to additional action, and the blood is propelled from it through the vessels with unnatural force. The heat of the body is then restored, and nature directs the blood to the part

in which it is particularly required; and thus does the constitution assist in the production of suppuration. These excessive exertions lead to relaxation and debility, and the vessels pour out from their extremities upon the surface of the body, the watery parts of the blood in the form of perspiration; but when pus is easily produced, as upon some mucous surfaces, and upon the surfaces of wounds, such constitutional effects are often unobserved.

Local symptoms of suppuration. — The local symptoms which attend this process are, that the part becomes more painful; that the kind of pain is changed from an equal and dull sensation, to an acute and pulsatory pain, accompanied by throbbing of the vessels, so that the patient can reckon his pulse in the inflamed part. The swelling rises at one part, so as to form a portion of a smaller circle, or to be, in the surgical expression, pointed; the redness is increased, becoming more of the arterial kind, so that there is a blush upon the surface. A fluctuation may be perceived by feeling the part with two fingers at a slight distance from each other. The cuticle separates, a vesication destroying its attachment, and the cutis and cellular membrane become thin, so that the matter gradually approaches the skin.

Sometimes the external surface of the skin ulcerates in a number of spots to meet the ulceration from the interior, but generally the process is entirely from within. At length an opening of an irregular kind is produced, and the matter gradually escapes, as the aperture enlarges.

Time required for the formation of pus. — The time required for the completion of this process depends upon the constitution of the patient, and the nature of the parts, in which, or under which, the matter is formed. If seated under a

tendinous structure, abscesses are very slow in proceeding to the skin, on account of the difficulty which attends the ulcerative process in tendons. In a healthy constitution from seven to fourteen days will be required to form and to break an abscess in the breast of a female, who is otherwise healthy, although it is sometimes a much longer time.

Parts prone to suppuration. — Some parts of the body are very prone to the suppurative inflammation, so that in them suppuration seems to precede the adhesive process; a slight degree of inflammation, producing suppuration, or a higher degree of it, adhesion. Mr Hunter first observed this circumstance.

The urethra. — The urethra, when it has irritation produced in it from the introduction of a bougie, frequently suppurates, but very rarely adheres.

Trachea. — The trachea, if it inflames, generally suppurates, although the adhesive inflammation does sometimes occur in it.

Nasal membrane and lachrymal canal. — The lining membrane of the nose, if it inflames, easily suppurates, the mucous becomes first of a yellow colour, and then pus is secreted. The lachrymal sac and duct very generally suppurate, under inflammation; and hence the disease is called *fistula lachrymalis*, from the suppuration proceeding to ulceration, and the matter being discharged through the fore part of the cheek.

The antrum. — The antrum maxillare and the frontal sinuses also readily suppurate under inflammation.

Joints. — When joints inflame, the internal surface of the ligament which secretes the synovia is more disposed to the suppurative than to the adhesive inflammation, on account of its mucous structure; and

there is considerable difficulty in preventing suppuration in these cavities, when they have been opened by wounds. The skin, the cellular tissue, and the external part of the ligament will adhere; but the synovial surface, which secretes a mucilaginous fluid, does so with difficulty. The surgeon is therefore obliged to depend upon the production of adhesion in the external parts. The same observations apply to wounds of thecæ, which are very apt to suppurate, and the matter to take the course of the tendon to the wrist, and to produce by its confinement the most violent symptoms of irritation.

In making openings into joints to remove extraneous bodies, it is desirable to draw the skin aside before the aperture is made; and, when made, it should be suffered to return to its natural situation, and it forms a valve to cover the opening: in this way I first saw Mr Cline perform the operation, and in the same manner I have since done it myself.

The vessels of mucous surfaces being large, allow of the passage of the globules of pus more readily than such globules could pass through the vessels of serous surfaces, which naturally secrete the more watery parts of the blood. It does not in the least diminish our admiration of the law, that the interior parts of the body shall adhere and the outlets suppurate, because we know that it is founded upon a difference in their structure.

The evil which arises from a suppurative process, upon surfaces naturally serous, may be shown in the following examples, in which the suppuration arose on serous surfaces from an unhealthy state of the constitution.

Cases.—I amputated the leg of a man, in Guy's, for a very unhealthy ulcer. In a few days after the operation he became delirious, had much pain in bending his limbs, and had a low fever, which might have

been mistaken for typhus, although it was only a fever from irritation: in the second week from the amputation he died. Upon examination of his stump, I found matter had formed above the ligature, both in the artery and vein; it had not mixed with the blood, but its formation and confinement produced the violent symptoms of irritation which followed. The vessels were also inflamed above the part in which suppuration had happened, which was probably the cause of fever; the occurrence is but rare, and was probably the result of a very irritable constitution. Also, in a case in which I tied the saphena major vein, matter formed in it, and the most violent constitutional irritation was produced, with delirium; and although the patient did not die from this cause, she was in the most imminent danger.

The formation of matter in the pleura, pericardium, and peritoneum, succeeding the adhesive inflammation, shows the wise provision of that law which renders them prone to the adhesive process.

Formation of pus.—Pus is not, as it was formerly supposed to be, a fluid formed by the dissolution of solids, but is produced directly from the blood, changed somewhat in its nature from the action of the blood vessels. That it is not the product of the solids of the part upon which it is produced, is seen in the application of a blister to a surface. For instance, let a blister be applied upon the chest, and the cuticle raised, the serum which is produced, and the fibrin which is poured out, be removed in a few hours: inflammation arises upon that surface, and pus is formed on it from the extremities of the exposed vessels. Some little change may take place after the effusion, but the fluid is directly formed from the open extremities of the vessels. On all serous surfaces, as the pleura, pericardium, and peritoneum, there is no loss of substance in the largest productions of matter; but, on the contrary, great

addition is made to these membranes. Is the urethra abraded in gonorrhœa, or the trachea in its suppuration?

Pus seems to possess no chemical quality by which it can act upon dead, much less can we conceive its power of dissolving living solids. Bones will remain for months and even years in pus without solution, and tendons continue in it for several weeks, and at last separate by sloughing. Experiments were made in this Hospital, whilst I was apprentice here, to ascertain if portions of meat would be dissolved in pus; but no diminution of their weight was found until the process of putrefaction commenced; it follows then, as milk, bile, saliva, or tears, are produced from the blood by the action of the blood vessels, so is pus but an altered state of the blood, produced by the extremities of the secreting vessels upon the natural surface, or upon the granulations of an ulcer.

Inflammation precedes the formation of matter: in healthy persons it is active; in the debilitated and scrofulous it is often very slight, and the pus which is produced is generally less perfect. Sometimes even there is such a change of action that the products entirely differ, being serous and curd-like, or even chalky, in scrofulous abscesses.

A cyst is formed in an abscess to surround and confine the matter; but it is to be understood, that this cyst is not a cell in which the matter is contained, but the cellular tissue has in its interstices adhesive matter effused, which prevents the pus from passing into its cells in a healthy abscess.

Nature of pus. — Pus is a yellow fluid: if poured into water it sinks in it, and is consequently of greater specific gravity than water; on the other hand, mucus generally swims in water. It appears to contain the constituent parts of the blood: examined under the microscope, it possesses globules, which

differ from those of the blood in colour, but greatly resemble them in their general appearance. These globules float in a fluid which resembles serum in its coagulating by heat, as is easily seen by exposing pus in a spoon over the flame of a candle. Pus also contains abundance of fibrin: if water be poured upon pus until the solid part, which remains at the bottom of the vessel, be entirely deprived of its serum and globules, numerous portions of fibrin are found remaining; although not exactly the same size, yet they have a great uniformity of appearance. Thus pus is composed of serum, fibrin, and globules; and if I were to hazard a theory upon this subject, I should say that pus was composed of the constituent parts of the blood, slightly changed in their character by inflammation.

It does not appear to be prone to a putrefactive state; and we therefore find, in its healthy state, it has not a putrefactive smell; but changes in the constitution will sometimes render it excessively putrid.

Case. — A butcher's servant fell from a window upon one of the hooks of the shambles, which caught him, and suspended him by the ham until he was extricated: he was brought into St Thomas's Hospital, in which he died of tetanus ten days after the accident. An abscess appeared in his ham two days before his death; and when it was opened, the matter was found insufferably offensive.

Matter will be also rendered offensive by local circumstances, as by diseased bone. For example, in diseases of the bones of the nose, the smell is more offensive to my olfactory nerves than any thing I know in nature.

Nature of fetid pus. — Matter thus changed or altered, by the presence of blood or of sloughs, was found by Dr Crawford (formerly physician of this Hospital, whom I recollect making many experi-

ments upon the subject) to contain sulphuretted hydrogen gas.

Secretion of pus suspended or changed. — A state of fever, or an inflammatory excitement in the part, will suspend the secretion of matter. We see, in fevers, irritable sores becoming dry, and often almost appear to heal, whilst that state of constitution continues; but becoming again irritable and secreting largely when the fever subsides.

When inflammation occurs upon a leg which has been long the subject of ulcer, the sore ceases to secrete whilst the surrounding skin is red, but matter is reproduced so soon as the inflammation ceases. The character also of the matter becomes changed by local inflammation. Thus we see serum substituted for pus, or a red fluid, composed of serum and red particles, produced whilst inflammation exists in the vicinity of a sore.

The fluid last described often irritates the surrounding skin and produces excoriation; but pus, when formed in its usual manner, is incapable of producing irritation on the surrounding parts, so that we see the skin for days, and even weeks, covered with the matter produced in compound fracture, yet it remains healthy; but let there be fever, or the irritation of an exfoliating bone be present, and the skin soon becomes inflamed from the different quality of the fluid produced.

That pus is formed by the action of vessels is well evinced by the changes which it undergoes in specific inflammations; for then not only is pus produced, but matter possessing poisonous qualities. The matter of gonorrhœa is applied to the urethra, and a poisonous pus is secreted; and it will proceed for weeks, or even months, and be still capable of conveying a similar infection. Our sailors have thus been the means of conveying gonorrhœa to Otaheite, and to

many others of the South Sea islands. The matter of chancre produces a sore capable of affecting the glands on the groin, the skin, the periosteum, and the bones.

The fluid of small pox will occasion, by its insertion in the skin, poisonous matter, capable of exciting fever and covering the body with pustules, all containing similar matter to that which originally produced the inflammation at the inoculated parts: a poison not extinguished by death; for a friend of mine inoculated his daughter from a pustule of a subject dead from small pox, and she had the disease not in a severe form.*

Utility of suppuration. — It is obvious, that a process like that of suppuration, and which is so frequent an effect of inflammation, must be instituted for beneficial purposes; and the uses which it serves are as follow: — Upon the surface of wounds, the principal advantage derived from its presence, is, that it keeps the granulations moist, and thus enables the vessels to elongate, and to form additions to the granulations, until the cavity is filled by them; without the production of this fluid, the surface of wounds could never heal, because the granulations would be destroyed.

In expelling extraneous bodies. — The second use of matter is seen in abscesses, in which it is the means of exciting absorption, and thus of producing an opening, by which the cause of irritation may be removed; and it afterwards covers the rising granulations until they reach the surface of the skin.

The coagulable matter, which the pus contains, will lead to the healing of a sore without any adventitious aid. Thus we see, in other animals, sores en-

* In the Lecture on Poisons, a very curious case will be given of a new disease, produced by the translation of a poison from the horse to man.

crusted with the solid matter of pus left by evaporation: under this is fluid pus contained; and when the incrustation is removed, healthy granulations appear. In sores obstinately resisting different applications, I have seen them thus encrusted when left without applications of any kind, and heal gradually without further attention.

Caution in stopping long-continued suppuration.—When sores have long existed, some caution is necessary in healing them: nature appears to produce a quantity of blood equal to the discharge which they have supported, and to continue to do so after it has ceased. Inflammation of the lungs and apoplectic seizures will sometimes follow their sudden cicatrization. This may be prevented by great attention to the secretions, by giving frequently calomel at night, and an aperient in the morning; or by occasionally taking away blood, when the above symptoms intervene. The surgeons of former times made issues, or setons, with the same view; but they are now very much discontinued, because by such attention as I have advised their use is superseded. But still it cannot be denied, that a sore will sometimes relieve symptoms of diseased lungs, and even of determination to the brain, independent of any direct counter irritation upon the affected part.

Case.—Mr Wilson, formerly lecturer on anatomy in Windmill Street, informed me, when he was a young man, that he had hæmoptoe and other symptoms of pulmonary disease; that an ulcer formed upon his arm, by which the symptoms were relieved; that he was anxious to heal the sore, and the symptoms returned upon its cicatrization; that the discharge was reproduced, and the pulmonary symptoms were again relieved.

The suppression of discharges from the ear is attended with great danger of producing matter on the brain.

Cases. — Dr Meyer and myself attended, in Austin Friars, a gentleman who died with hemiplegia, and apoplectic symptoms, from the sudden suppression of matter in the ear. I opened this gentleman, and found matter on the cerebellum opposite the labyrinth of the ear.

Dr Babington and myself attended a gentleman in Cheapside, in whom I also found matter upon the surface of the brain, from an arrest of secretion of matter from his ear. We also attended together, in St Paul's Churchyard, a similar case, in which matter was found between the dura mater and surface of the brain.

Dr Cholmely examined a woman in Guy's Hospital, who died from a similar disease. I can call to mind eight cases of inflammation of the brain, produced by suppression of suppuration in the ear.*

With respect to the treatment of suppuration, it consists principally in the application of fomentations and poultices; but we shall treat of this subject more particularly when we describe abscesses.

* It is curious for how long a period these chronic suppurations will continue. The following is an extract of a letter which I received from a village in Carmarthenshire. An attack of scarlet fever, at ten years of age, 'left me extremely deaf in my left ear, and with a discharge of matter from it, which has continued ever since; I am now thirty-seven years of age. In the course of the time that has elapsed, I recollect the discharge having been more than usual about four or six times, which continued about a day, and was always attended with a dead aching pain in my head,' &c, &c.

LECTURE VI.

ON ULCERATION.

Definition. — ULCERATION is the absorption of any constituent part of the body.

Effects of inflammation on the blood vessels. — We have already endeavoured to explain to you, that under the action of the vessels which accompanies inflammation, an increased deposit follows from the arteries; also that this deposition depends on the stage of the inflammation, and the texture of the part in which it is seated; thus the inflammation is either adhesive or suppurative; and it ends in the one state in the immediate production of adhesion, and in the other in the effusion of a quantity of purulent matter from the extremities of the vessels.

Effects on the absorbents. — But the influence of inflammation is not confined to the arteries; it has also an effect on the absorbent vessels, which are thrown into a state of inordinate action, whenever any considerable quantity of blood is determined upon them.

There is a natural balance between the action of the arteries, and of the absorbent vessels, in a state of health, and at the adult period of life, the portion of matter deposited by the arteries, and that taken into the system by the absorbent vessels, are as nearly as possible balanced. In infancy a greater quantity is poured out by the arteries than the absorbents remove; but in age, a smaller quantity is deposited than absorption is taking away: thus the balance is destroyed in a different manner, at different periods of life; but when a considerable

and unnatural absorption takes place of some part of the body, that absorption is denominated ulceration.

It was formerly thought, that it was necessary to the ulcerative process that matter should be formed; but this opinion is not true, for ulceration often occurs without its being accompanied by any purulent secretion. The formation of matter, therefore, is not necessary to the process of ulceration.

Causes of ulceration. — The great cause of ulceration is inflammation united with pressure. If the inflammation be considerable, and the pressure but slight, ulceration will be produced; and if the pressure be very considerable, and the inflammation but slight, still there will be ulceration.

Pressure. — As a proof, both that pressure is the cause of ulceration, and that ulceration is not necessarily accompanied with the formation of matter, I will give you an example in aneurism. Here is a specimen on the table of a large aneurism of the aorta just above the heart, in which you may pass your hand into the opening produced by the ulceration of part of the ribs and sternum; those parts having been absorbed by the pressure of the aneurismal sac producing an increased action of the absorbent vessels. Here the pressure is exceedingly great; but the degree of inflammation is very slight. In the same manner we see an aneurism of the aorta in the fore part of the spine, producing absorption of the vertebræ by the pressure of the aneurismal bag, though no matter is effused; the ulceration being produced by pressure, accompanied with slight inflammation, but not by any secretion of matter.

From these facts we are led to conclude, that the formation of pus is not necessary to the ulcerative process, but that it is produced on surfaces of the body where it is necessary for the protection of sores, by covering the granulations.

Symptoms of ulceration.—In acute ulceration the pain is severe, and the irritative fever considerable; but in the chronic the pain is less, and the fever is of the slow or hectic kind. If you ask the patient, he will tell you the pain is of a gnawing kind, as if there were insects feeding on the part.

With respect to the appearance of the ulcerated part, it looks as if it were worm-eaten; the surface is rough and very irregular.

Extent of ulceration.—Sometimes a very considerable portion of the body is removed by ulceration. Here is an example, on the table, of an ulcerated tibia. See to what an extent ulceration has removed not only the cancellated structure of the bone, but the shell in which that structure is contained. Here is another example in which a great part of the tibia has been removed; the ulceration has extended six or seven inches, so that little more than the fibula remains; such is the power of the absorbent vessels of feeding upon the body and upon themselves.

Its rapid extension.—The ulcerative process is sometimes extremely rapid in its progress; as much of the body will be destroyed in a few hours, as it will require weeks and months to repair.

In proportion to the extent of surface destroyed will be the difficulty with which that surface is closed. Something will depend also on the form of the ulceration, and the kind of surface exposed; but the general rule is, that the difficulty of the restorative process is proportional to the extent of surface destroyed.

Laws of ulceration.—It is a curious law with respect to ulceration, that it has a tendency to the nearest external surface. This is a law which is attended with the most salutary effects; for, if it were otherwise, the body would very frequently be

destroyed by the ulcerative process. In consequence of this tendency, matter formed at a depth in the body, finds its way through the integuments, instead of proceeding through more important parts. Many examples may be given of this law. One of the most remarkable is this: Matter forms not unfrequently behind the sternum close to the pleura and pericardium, which membranes are extremely thin. From the proximity of these membranes it might be expected, that the matter would generally open into the pleura, and, by discharging itself into the cavity of the chest, destroy life. Instead of this result, however, the pleura undergoes no other alteration than that of becoming thickened, and while it is acquiring this addition of substance, the process of absorption is going on in the inner part of the sternum, an aperture is formed through it, and the matter makes its way through the bone and integuments, rather than through the pleura and pericardium. The same circumstance occurs to the peritoneum. If matter be formed on the abdominal muscles, the peritoneum is very rarely absorbed to admit the matter into the cavity of the abdomen; but the matter makes its way through the integuments, and finds an outlet on the surface of the body.

So in an abscess of the liver, the matter is discharged, not through the skin, which is a more remote surface, but into the cavity of the stomach or intestines, which may be considered as the nearest outlets, from which it is thrown up by vomiting, or discharged with the fæces.

These effects are produced in the following manner: the surface of the abscess becoming united with a portion of intestine or stomach by the adhesive process, the ulcerative action commences; by which a communication is formed between these surfaces, and the matter is discharged in the manner

before mentioned, without danger, or with less danger to life.

The same thing happens in absorption of the bones. Thus, in ulceration of the tibia, the matter breaks through the skin; on that surface which is only covered by skin and periosteum. This is a law in some degree depending on the greater irritability of those parts which are nearest the surface of the body. The most external surfaces of the body are more irritable, and more subject to vicissitudes of action from corresponding changes of temperature than other parts of the body, and they give way to ulceration more readily than those which are more deeply seated, and possess more equality of circulation, and of temperature. Another reason is, that the adhesive process glueing the more internal parts to each other, they become united, and in this way form a considerable solid; but the more external surfaces have no such support. An instance of this is found in the adhesion of the pleura to a lung, so as to form one structure. It may be considered, then, as a law of the animal economy, that the ulcerative process has a disposition towards the nearest external surface of the body.

New parts prone to ulceration. — Those parts of the body which are newly formed, are more liable to be absorbed than those which have long existed. A part covered by a cicatrix proceeds rapidly to ulceration, because it is more weakly constituted than those which have existed longer. The irritability of a part is proportional to its weakness; and those which are weak and irritable, fall most readily into the ulcerative process.

Examples. — To take a familiar illustration; when a child labours under symptoms of constitutional derangement in dentition, you cut its gums. You do so, not for the purpose of making an immediate

passage for the tooth, but because, when the gum by the adhesive process heals, a cicatrix is produced by this little operation which is very readily absorbed; and the result is, that when the tooth rises, the child cuts it with much less pain and irritation, than it would otherwise have done.

If a man have inflammation in his leg, and this is seated near a place where ulceration previously existed, the scar produced by the old ulcer gives way much more readily than the original skin. I have observed, that if a patient under gonorrhœa has had an abscess in the urethra, which will now and then happen in consequence of suppuration of the lacunæ, or if from that cause he has had an abscess in the scrotum, or on the side of the penis, a second gonorrhœa will be sure to be followed by a similar abscess. Proceed with as much care as you may, guard against inflammation with all possible caution, and yet if abscess existed in the first gonorrhœa, it will generally return in the same part in a succeeding disease of the same kind.

Some of the most remarkable instances of the readiness with which the process of absorption attacks newly formed parts, may be seen in Lord Anson's Voyage round the World; a work which, I doubt not, is generally known to you. It is a most able and entertaining publication; and if any student has not read it, I can strongly recommend it to his perusal; for while professional knowledge should undoubtedly be the first object of your pursuit, general literature should not be neglected, and is so far from being incompatible with that primary object, that it cannot fail to enlarge your views, and give efficacy to your professional researches. So intimate is the connexion between every object of useful and scientific inquiry, that there is hardly one branch of knowledge which does not in some measure throw

light and illustration upon another. The circumstance which I am about to mention may illustrate this remark. Lord Anson's book is one of the most interesting works which has appeared on nautical subjects; nor is it without its use as illustrative of a principle in surgery. Lord Anson's expedition to the Pacific Ocean was undertaken with a view of destroying the power of Spain in that quarter. As he was obliged to sail sooner than he expected, many of his crew were invalids, some having cicatrices, and others having had fractured bones, long since united. In his passage round Cape Horn, he encountered very severe weather; many ships were obliged to return, some were lost, and the crews of those which succeeded in getting at last to the Isle of Juan Fernandez, had suffered great hardships. In doubling Cape Horn, the crew suffered severely from attacks of the scurvy; and it was remarked by the chaplain, who was an observing man, though he knew nothing of our profession, that the men who had ulceration before, were attacked with ulcers in the same parts; and if their bones had been formerly fractured, they became disunited. This does not excite surprise, because we know that scurvy produces the ulcerative process, attacking the gums, causing profuse bleeding, &c; that the ulcerative process has a stronger disposition towards parts newly formed, and that in this case, therefore, it appeared in parts where ulcers had formerly healed, and in disunited limbs where callus had previously formed. When the men obtained fresh vegetables, &c, on shore, they recovered their health; their bones united, and their sores healed. There cannot be a better example than this, to show the readiness with which newly-formed parts ulcerate, when compared with the original organs of the body.

Parts remote from the heart more readily ulcerate. — The parts more remote from the heart ulcerate more readily than those in the vicinity of it. This circumstance led me to say, that when the vital action is feeble, and the power of the circulation diminished, we find a greater disposition to the ulcerative process than otherwise. Thus for one ulcer in the arm, we find twenty in the lower extremities; and it cannot but have been observed in going through our wards, the great number of sore legs, compared with ulcers of other parts.

Parts little organized ulcerate with difficulty. — In those parts which are endued with little vascularity, ulceration takes place with difficulty. This is the case with tendons. Tendinous parts possess very little blood; very few arteries or absorbent vessels are distributed to them. Hence the process of absorption proceeds with great difficulty, and tendons will slough to a great extent, rather than become absorbed. This circumstance must influence our practice. In abscess, under the fascia, an incision should be made as soon as possible through the covering, to liberate the confined matter. So in abscess of the finger, when the constitution suffers because the theca will not give way to the process of ulceration, and the nervous system becomes irritated by the pressure of confined matter, an early incision should be made to liberate the matter, and give relief to the constitution. The same practice should be pursued in abscess of the palm of the hand.*

* The blood vessels ulcerate with extreme difficulty, and they may be occasionally seen completely exposed, from the destruction of the surrounding parts by the ulcerative process. In the extensive ulcers, which sometimes occur in the groin of debilitated patients, from venereal affection, I have several times seen a portion of the saphœna major vein, as well as a part of the femoral vessels, exposed; and I have a cast in my posses-

Use of ulceration. — The ulcerative process is useful to the animal economy, in removing extraneous bodies from the system. Thus a ball lodged in the body is removed.

Case. — A gentleman who had formerly received a wound above the zygomatic arch from a ball, called on me, having a swelling on the side of his face. I asked him whether he thought the ball was there? to which he replied, no. Upon cutting on it, I found that it was the ball by which he had been wounded some years before. It had travelled beneath the zygoma to the middle of the cheek, on the surface of the parotid gland, from whence I removed it; perhaps it was assisted in its course by the action of the temporal muscle.

Case. — I saw a boy at Walworth who had been attending a target, at which some volunteers had been firing: he thought himself safe at a distance of thirteen yards; he was mistaken, however, for one of them shot him in the collar bone. Some months after he came to Guy's Hospital, and I removed the ball from near the middle of the upper arm. The ball, by its pressure, had occasioned suppuration and ulceration, which had enabled it to travel to the situation from whence I took it, and the matter was discharged at the wound by which it entered.

It is useful also in the exfoliation of portions of bone, in separating parts which would otherwise remain in the body, perhaps during the life of the individual. In three or four months a considerable portion of exfoliated bone will be separated by the ulcerative process. Thus in the other Hospital the whole of the leg has separated. By my advice

sion (taken after death from a young woman who died in Guy's Hospital, from an extensive sore of this description), in which this exposure of these vessels is very extensive. — T.

nothing has been done, and the process of nature has been left to take its course, and has been performed in eight months. The bones themselves will separate by the process of exfoliation, and thus nature will herself perform the operation of amputation without loss of blood, and with little danger to life.

I shall now proceed to the consideration of

ABSCESSSES.

Definition.—An abscess is a collection of matter in a cyst, produced by inflammation.

Its formation.—What happens in the formation of an abscess is as follows: First, there is an inflammation of the adhesive kind in the cellular tissue, by which the different cells of the cellular membrane become filled. A slight ulcerative process follows; and the inflammation still proceeding, a little cavity is formed by the ulcerative process: a space being thus produced for the effusion of matter occasioned by the second stage of inflammation. A drop of matter is, at first, secreted into the cavity; and as soon as it is poured out, its pressure occasions an increase of the ulcerative process which adds to the cavity previously formed; fresh matter is then produced, and the surrounding solids ulcerating, it is accumulated, but it excavates chiefly on the side towards the skin, and very little in the opposite direction; a circumstance which shows that matter has no power of corroding, as was formerly supposed, when it was thought that matter acted chemically on the solids like an acid or alkali.

Danger of abscesses.—Abscesses are dangerous, according to the following circumstances.

From their size.—First, from their size. It is not, however, the quantity of matter produced which renders them dangerous; but the difficulty which

nature has in repairing the devastation made by excavation of the solids, from the pressure of the matter.

An abscess may contain a great quantity of matter, and the constitution may have been scarcely affected by it; but very soon after it is opened, the constitution begins to suffer. It is not, therefore, the quantity of matter, but the process of restoration after the evacuation of the matter, which affects the constitution. The largest abscesses which occur in the body are those of the liver. Patients will sometimes recover from abscesses of this part, in which immense quantities of matter have formed. I remember one of enormous magnitude, from which the patient recovered.

Case. — Dr Saunders, the lecturer on medicine at Guy's Hospital, asked me to see a woman who had a large abscess in the side. I made an opening into it with a lancet, and it discharged a surprising quantity of matter, as much as would fill two thirds of a wash-hand basin; but I have heard, indeed, of cases of much larger quantities of matter having been discharged. After pressing out the matter, I passed a roller tightly round the abdomen, with a view of producing the adhesive process, which now and then occurs. I did not see the patient again; but some days after I met Dr Saunders, who asked me how I thought the patient was proceeding: I told him I supposed he asked me, because he thought me very sanguine; and he replied, that I should be gratified to learn, that the woman was doing extremely well. In fact, no more matter was discharged, and the patient got well, without any bad symptoms. I have mentioned this case, because it may guide your practice when you are operating upon large abscesses, and show you the propriety of endeavouring to procure the adhesive process, by bringing the sides of

the abscess together. Very large abscesses sometimes terminate favourably, but in a great number of cases they destroy life.

From their number. — The next circumstance which renders abscesses dangerous, is their number. Thus a great number of little abscesses on the surface of the body, in small-pox, frequently destroy life. Here nature performs the suppurative process; the pustules die away, and the cuticle is separated from the surface of the body; but nature has not the power, in many cases, of repairing the destruction of the cutis; the want of which occasions great irritation, and the patient dies, as if destroyed by a burn or scald.

From their situation. — Abscesses are also dangerous from their being situated in vitally important parts, such as the brain, heart, or lungs. Abscesses in the brain are very rarely recovered from, nor are those of the heart. Abscesses of the lungs, in some constitutions, are dangerous, but are most recovered from, when the quantity is large.

From their pressure on important parts. — They are dangerous even when they are not seated in parts of vital importance, if they press on organs essential to life. A woman was admitted into this hospital for a complaint in the throat, occasioned by swallowing a pointed bone. All she complained of at first was, a soreness in the throat; but she was shortly after seized with difficulty of breathing, which increased until she died. On examination after death, I found, upon making an incision into the pharynx, that between it and the fore part of the vertebra, a large abscess had formed, which, by pressing the pharynx forwards on the epiglottis and glottis, occasioned difficulty of breathing, and in the end destroyed life. Shortly after this, Dr Babington came to Guy's Hospital with a friend of his, who

was labouring under great difficulty of breathing. He requested me to examine his throat; having put my finger on the back of the pharynx, and felt fluctuation there, I told him that this was a case, of which I had seen an instance, in which the patient had died from a collection of matter formed in the same situation. I immediately procured a trocar, and passing it into the pharynx, a considerable quantity of matter was discharged, and the patient was relieved. This was a case, which, but for an operation, would probably have terminated fatally by the pressure of the matter on the glottis and epiglottis. In the same manner, abscesses in the perineum or between the prostate gland and the rectum, will, by their pressure on the urethra, sometimes occasion retention of urine, and destroy life.

Thus we find that abscesses, though situated in parts not of themselves vitally important, sometimes become dangerous by their pressure on more important organs.

The danger attending the formation of abscesses arises from their size, number, and seat, or from their pressure on important parts: there is also another danger, if abscesses occur between the bones and the covering of bones. Whenever bones form the boundary of abscesses, such abscesses are tedious in their cure, and, in many cases, dangerous. Thus it is in psoas abscess: in this disease the matter begins to collect on the fore part of the vertebræ, and proceeds through the psoas muscle, till it reaches the groin, where it makes its appearance just below Poupart's ligament; and from examination of these cases after death, the vertebræ are found ulcerated. It is not my intention now to enter into the consideration of psoas, or lumbar abscesses, as they will be treated of on another occasion; but I just mention the complaint, to show the danger of abscesses be-

tween bones and their coverings; and that the reason is, the union between the soft parts and bone is with difficulty produced, and the process of restoration is extremely tedious.

Abscesses are acute or chronic.

Acute.—The adhesive inflammation first occurs: this is succeeded by the suppurative; and lastly, the ulcerative process; and it is about three weeks, from its commencement, before matter is discharged.

Chronic.—But chronic abscesses are slower in their march: take, for instance, the psoas abscess to which we have alluded: it is often six months before matter makes its appearance in that complaint. If a person applies with a psoas abscess, and you ask how long he has had pain in his loins, he will tell you for four, five, or six months. There are varieties in the irritability of different constitutions; but when you see a man with swelling in the groin, which, if he coughs, rebounds under your hand, and has a fluctuating feel, and who, for four or five months, has had pain in his loins, you will say, that he has psoas abscess; so these are the criteria by which you are to know it. Chronic abscesses sometimes occur in the female breast.

Case.—A Lady was sent to me from Sussex some years ago to have her breast removed: knowing the surgeon who had recommended this person to me to be an intelligent man, I did not at first attentively examine the breast, but said to the lady, I will call on you soon, and perform an operation. I fixed the day, and was about to perform the operation, the patient being seated in a chair before me; when I said to the gentleman who was assisting me, I think that I feel a fluctuation in this swelling, at least I will not proceed to remove the breast till I have ascertained the fact. I made a small opening

into it, and a quantity of matter gushed from the part. Thus a chronic abscess had existed for a considerable time.

Case. — Very lately, while visiting Guy's Hospital, one of the young gentlemen brought me a woman who had a chronic tumour of the breast. On examining it, I perceived a slight fluctuation, and stated that most probably it contained matter, but was told, in reply to this observation, that it had existed for several months. I said, however, that is no proof of the absence of suppuration; I made a puncture into it, and let out a quantity of matter, and went away smiling. I merely mention these cases, to put you on your guard; for I have seen two tumours of the breast removed, which were only chronic abscesses; and thus, from an ignorance of this circumstance, you might subject your patient to a cruel operation, where a small incision would have done.

Treatment of acute abscess. — In the treatment of acute abscesses, the best medicine you can give is the liquor ammoniæ acetatis, sulphate of magnesia, and opium, of which give small doses, three or four times in the day. By this medicine you lessen irritation, and expedite the suppurative and ulcerative processes; no medicine that I have observed gives so much relief. The sulphate of magnesia prevents any costiveness, the opium tranquillizes the nervous system, and lessens pain. The local treatment consists in the application of fomentations and poultices, to promote warmth and moisture. A greater quantity of blood is sent to the part, and a relaxation of the vessels takes place; this expedites the suppurative process, and then the ulcerative follows with more ease. The kind of poultice to be applied to the part is of little importance, as it is only the medium of applying heat and moisture; linseed

meal and water, bread and water, and bread and milk, may be either of them used; the part must be covered with oil-silk, for by its assistance the heat of the part is preserved, and evaporation prevented. It is desirable in the suppurative process to prevent evaporation; oil-silk I generally use in private practice; it is clean, agreeable to the patient, and most conducive to his advantage.

Before proceeding to the consideration of chronic abscesses, I will say a few words on opening abscesses. If an acute abscess goes through its different stages without great pain or constitutional irritation, and is not likely to be of great magnitude, the best practice is to leave it to nature.

Mode of opening abscesses. — Acute abscesses beginning under aponeurotic fasciæ, ought to be opened as early as possible, the earlier the better; the moment matter can be felt to fluctuate, it is advisable to make a free opening, both as regards the constitution and the part. Whenever the matter is formed close to a bone, it will be right to open the abscess, excepting in cases where it occurs between the cranium and pericranium, from severe courses of mercury. Mercury will inflame the periosteum (and the pericranium is a part of the periosteum) to a greater degree than the venereal disease itself; and in those cases in which a fluid exists between the pericranium and bone, unattended with any blush, do not open it: it will be removed by purging and giving bountifully the decoction of sarsaparilla. But when matter is formed, and there is a blush on the skin, it will not be absorbed, an opening must be made, exfoliation often takes place; but when there is no such blush, beware of opening the swelling.*

* About a year ago, I was asked to visit a gentleman who was suffering from the formation of abscesses between the pericra-

Treatment of chronic abscesses. — The treatment of chronic abscess is very different from the acute. In the last case, you wish to diminish the state of excitement in the constitution; and, in the former, you do all you can to give it additional powers, by allowing a generous diet and giving the ammonia and bark: the ammonia is the medicine on which the principal reliance is to be placed. You know that of late bark has not been much used; but we are apt to run into extremes: — bark assists the suppurative process, and a generous diet must be allowed in order to increase the action of the parts, by giving tone to the constitution. Stimulant poultices should be applied, and the best I know is the muriate of soda (common salt) and water; a table spoonful of the salt to a pint of water, and the poultice should be wetted with this. Yest and oat-meal, vinegar and flour, each of these expedite the process of suppuration. In indolent cases it is customary to apply stimulant plasters; and the best is the empl: galb: comp.; it is stimulating, and consequently excites the action of the part; the emplast: ammon: cum hydrarg: and the emplast: thuris comp: are also used. The latter is more tranquillizing, and in general excites slight perspiration over the part; similar in its operation to the soap cerate, which is also of use. These then are the remedies,

nium and bone. He had been taking large quantities of mercury, for syphilitic complaints, and during its exhibition the pericranium became inflamed. I found, on examination, several tumours, of various sizes, situated on different parts of the cranium, and in two or three of them a distinct feeling of fluctuation; more particularly in the largest, which had formed on the forehead. Although the integument was slightly discolored, the abscesses entirely disappeared, without the matter being discharged, by the free use of sarsaparilla with minute doses of the oxy muriate of mercury. — T.

local and constitutional, to be used in chronic abscesses; but it remains to be considered how chronic abscesses are treated when it is necessary to open them. Suppose you are called to a case where there is a collection of matter under the fascia lata of the thigh (the largest abscess in the body), extending, as it often does, from above the knee to the trochanter major, what would you do? Certainly it is to be opened — make an incision, half an inch in length, and discharge all the matter you can. Having done this, apply a roller, to cover the thigh, with the exception of the opening; the result of this is, in many instances, that adhesive inflammation is excited, and the sides of the cavities often readily unite; always taking care, in the application of the pressure, to leave the mouth of the wound uncompressed. The same directions are to be attended to in collections of matter, which are to be met with under the tendinous expansion, which covers the muscles of the leg and fore-arm;* the object is, to endeavour to produce the adhesive inflammation, as in the case of abscess in the liver, that I stated to you, from which the matter was evacuated by the puncture of a lancet, and afterwards by pressure; the adhesive inflammation was produced, and the recovery of the patient was effected. This then is to be your practice — to endeavour to procure an union of the sides of the cavity by the adhesive process.

Prevention of scars. — The prevention of scars is a great object, particularly in exposed parts of the body; this may appear of little consequence, but it

* The opening in those cases should be made at the most depending part of the abscess, that the matter may be discharged with greater facility; and if any fresh formation takes place, that it may have a free exit, and not disturb the approximation of the sides of the cyst. — T.

certainly is not so; scars from abscesses in the necks of females, excite in the minds of most of our sex a reluctance to associate with them; and thus many a fine young woman may, by such scars, be doomed to perpetual celibacy. No part of the practice of surgery has been more faulty than the manner in which abscesses of the neck have been treated. I have seen on one side of the neck large scars from abscesses that had been badly managed; whilst on the other side, where the treatment had been more skilful, scarcely any vestige of a wound was to be seen. I have from very early practice, and subsequent experience has proved to me its use, been exceedingly careful in the management of these cases. Aperients, with calomel and rhubarb, should be given; evaporating lotions should be used: you must be strict as to regimen and diet; the food must be nutritious, but not stimulating. The best mode to adopt in these cases, is to open the abscess before the skin be much affected, and as soon as a blush has appeared; thus scars will in general be prevented. It is desirable, in opening the tumours, to use a very fine knife, for two reasons. 1st. A small opening is made; 2d. It does not alarm the person. The knife I always use, has the blade an eighth of an inch wide, and it appears to the patient as a needle. When you press the sides of the wound, take care to squeeze out all the solid flakes of matter to be met with in scrofulous tumours. If this be not attended to, they will at last slough; but if, on the contrary, you carefully avoid leaving any of that unorganized substance, adhesion will take place, and the wound will heal. Almost every thing, in these cases, depends on getting rid of the solid matter. Bread poultices, mixed with a sulphate of zinc-lotion and spirits, may be afterwards used.

Case. — Whilst living in Broad Street, in the city,

a lady came to me with a tumour on the side of the neck ; I perceived on the opposite side several scars ; I said, ‘ Will you allow me to try if I can prevent a scar ? ’ She answered, it was for that purpose she had consulted me. Warm poultices had been used on the previous occasions : I made a very small opening, such as is made in bleeding, and squeezed out the contents, and she got well with scarcely a perceptible scar.

It is of the highest importance, then, to endeavour to prevent those appearances, which, on the exposed parts of the body, produce such painful feelings. In the higher orders of life particularly, a child with scars on its neck would be almost excluded from society. There is a point of great importance to be attended to, that is, the direction in which you make the opening ; always make it transversely, and not in the axis of the neck ; for, when the wound heals, it will be scarcely seen among the creases or folds of the skin. One more observation on this subject ; let me entreat you not to open these tumours when they have a purple blush upon them like the hue of a grape: the skin is thin and will slough, and if you then open the tumour, you will bring discredit on yourself. If the sides of the abscess do not unite in any part, a little injection of sulphate of zinc, or copper, may be used.

There are two other points connected with this subject, which I will mention to you, in conclusion.

Causes of Hectic. — First. — The causes of hectic fever. You are all aware that rigors followed by heat, and by perspiration, attend the continued formation of matter ; these occur once or twice in twenty-four hours, according to the irritability of the part and constitution ; and had it been asked thirty or forty years ago, on what it depended, it would have been answered, absorption of matter into the constitution ;

and some of the old surgeons used to put sponge to the surfaces of wounds to absorb the matter, and prevent its being carried into the system; but it appears to have no power on the constitution.

There is no doubt, but that the inoculation of putrid matter will sometimes produce fatal consequences; but the proofs that the absorption of common matter into the constitution does not produce irritative fever, are,

First. It is not during the accumulation of matter in abscesses, that the fever appears; but after abscesses have broken, the patient is attacked with it; certainly, the formation of matter will be attended with a slight fever, but not of the hectic kind; the tongue is clean, the pulse very little affected, and the person but slightly deranged; but after an opening is made into the part, constitutional irritation comes on, and life is then endangered.

2dly. The degree of hectic fever is not at all proportionate to the size of the surface on which the matter is formed. Look, for instance, at a large wound of the leg; the person will take his usual exercise, and feel little or no inconvenience: whilst a small ulcer on the lungs, or intestines, produces hectic fever of the most violent kind.

Case. — 3dly. Hectic fever often appears when matter has not formed. A woman, who had her leg amputated for a disease in the ankle, came into the Hospital for a pain in the knee of the same side. The symptoms of constitutional irritation were severe: the knee-joint was a little enlarged, violent pain existed in the part, with great constitutional disturbance, and she was obliged to submit to an amputation above the knee. There was no matter formed in the knee, but in the condyles of the thigh bone the ulcerative process had commenced; and the hectic fever was the effect, not of a disease of

the knee-joint, but of the cancellated structure of the thigh bone.

In some cases matter has been absorbed, and hectic fever has not been produced. Some years ago, Mr Cline tried the effect of digitalis on a boy sixteen years old, who had a psoas abscess; the size of the tumour diminished, the skin became flaccid; but as soon as the digitalis was left off, the matter returned, and, during the trial of the medicine, the pulse was lessened, but no hectic fever intervened; therefore, the belief of the absorption of matter being the cause of hectic fever is unfounded; for it is merely the result of the efforts of the constitution to repair an injury, or to cure a disease.

On the influence of air when admitted into abscesses.

— The last circumstance that I shall mention is, the influence which the admission of air into cavities has in producing local irritation: it is my duty to state to you my opinion; you must think for yourselves, only do not rest contented with thinking; make observations and experiments, for without them your thinking will be of little use. When an opening is made into an abscess, very slight irritation supervenes till the third day; I say the third day, because generally it is not until that time the constitutional disturbance arises. Surgeons of former times, in their opinion on this subject, maintained that it was the admission of air which produced the local irritation attending the opening of abscesses; and endeavoured to cure hydrocele by inflating it after the evacuation of the water. But what was the consequence? when the air became absorbed, the adhesive inflammation had not been produced, and the hydrocele returned. Again, experiments have been made on animals; air has been blown into the cellular membrane of a dog; nothing follows but a temporary stiffness, from the distension of the skin; and

when the air is absorbed the crackling goes off without adhesive inflammation.

Experiment. — Dr Haighton made an ingenious experiment, some years ago: he inflated the abdomen of a dog from an opening in the tunica vaginalis; and this mode of doing it evinced his knowledge; for in the dog, and many other animals, there is a communication with the abdomen from the tunica vaginalis. The dog was let loose; he was distended for a few days, but when the air was absorbed he became quite well.

Anecdote. — I know a curious circumstance which illustrates this: a butcher was drawn to serve in the militia; and being unwilling to become a soldier, he went to the regimental surgeon, and said that he had a large rupture, which disabled him; he showed it, and the surgeon sent him away. This man had made a puncture just above the scrotum, and inflated it with a blow-pipe, used in inflating the cellular tissue beneath the integument before flaying: the man himself mentioned it afterwards as a good joke.

What takes place when a lung is wounded and air is admitted into the cavity of the chest? The air inspired enters into the cellular tissue, the face and body become bloated; but it is afterwards removed by absorption, without producing any inflammation.

He who holds that the admission of air produces the irritation attending the opening of abscesses, takes a narrow and partial view of the case; for the cause of the irritation is as follows: If a wound be made into any cavity of the body, be it an abscess or a natural cavity, soon after the vessels of the part are divided, inflammation arises to heal the wound, whether it be exposed to the air or not. If it heal by adhesion, the influence is slight and directly terminates; but if the adhesive inflammation be insuffi-

cient or imperfect, then a suppurative inflammation follows, and granulations arise, which process produces violent influence both upon the part and constitution. The cause is, therefore, the division of the blood vessels, and not the presence of air; and its degree depends upon the ease or difficulty with which the injury is repaired.

LECTURE VII.

ON GRANULATION.

WE have endeavoured to describe the first mode in which the union of wounds is produced; namely, by the process of adhesion. We shall now proceed to consider the other mode of union of divided parts; namely, that by granulation; for the two processes which nature institutes for the purpose of filling up ulcers, and for the cure of wounds, are adhesion and granulation.

Definition.—A granulation is a newly formed substance, generally red in colour, and having the power of secreting pus.

Its formation.—The mode in which a granulation is produced is as follows;—it is a process very similar to adhesion, but differing from it in one respect.

When an abscess has been opened, or a wound has been produced, if the abscess be not immediately closed, or if the edges of the wound have not been brought together, inflammation is excited, and it occasions an effusion of the fibrin of the blood upon the surface of the wound. This fibrin is poured out in a layer which covers the raw surface. The layer of fibrin, or adhesive matter, soon becomes vascular; for blood vessels, which are elongations of the vasa vasorum of the divided arteries and veins are forced by the action of the heart into the fibrin which has been deposited, and this layer consequently becomes organised. The difference between the mode of union by adhesion and granulation is, that, in the latter, the vessels shoot through the layer which has been thrown out, terminating

by open mouths on the surface of the newly-formed substance, and secreting pus, at the same time that more fibrin is effused. The fibrin, which is poured out with this purulent secretion from the vessels, forms a second layer, into which the vessels supporting the first deposit of fibrin become elongated, and are the means of supporting the second covering, terminating as before, by open mouths on the surface of the substance effused. In this manner layer after layer is formed until the cavity becomes filled.

The difference in the process may be easily explained. Suppose an abscess be opened; the result is, that adhesive inflammation is produced on the internal surface of the cavity. A layer of adhesive matter is thrown out; and if the sides of the abscess are brought together by a roller, you may often prevent the future formation of matter. But if the union by adhesion does not take place, then granulations are formed as I have described.

Character of granulations. — The characters by which granulations are distinguished are these: their surfaces are uneven, they are generally red in colour, and they secrete matter.

Their vascularity. — The vessels shooting into granulations are very numerous. If you inject an ulcer of the leg, the great degree of redness in the granulating surfaces is accounted for, by the number of vessels divided into radiated branches, which enter the granulations, producing the arborescent appearance observed in them.

In examining the structure of granulations, they appear to become vascular in the following manner. Arteries enter at the base of the granulations and then divide into radiated branches; from these vessels pus is secreted and an incrustation is formed produced by a layer of adhesive matter, on the surface of the granulation. This is a little difficult to

conceive ; it is a circumstance which, I believe, has not been observed, and which I learned in the following manner : I took a portion of injected ulcer from the arm, threw it into alcohol, in order to observe its vascularity. After it was immersed in the alcohol, it was so opaque on its surface that no blood vessels could be seen. It was the fibrous matter covering the surface of the granulations which had not yet received the blood vessels.

A granulation may be considered as a gland, and the surface of an ulcer merely as a glandular surface. A gland is a part of the body in which secretion proceeds from the extremities of the arteries, and the blood which is not employed in the secretion is returned to the heart by means of veins which accompany the arteries. So in granulations, the arteries throw a quantity of blood near the surface of the wound, and there secrete pus. There is a vein accompanying each artery, and the fluid conveyed by the vessels is partly converted into pus on the surface of the ulcer, and is in part returned to the heart by the vein. Whilst the pus is secreting, fibrin coagulates upon the surface of the ulcer.

Their powers of absorption. — Granulations are not good absorbent surfaces in ulcers recently formed ; but if the ulcers have existed for any length of time, the absorbent vessels readily take into the system some substances which may be applied to them. In this way we frequently see persons salivated by the use of injections of the oxymuriate of mercury. It is not an uncommon practice to inject a solution of oxymuriate of mercury into sinuses, for the purpose of stimulating the vessels to produce granulations. If the sinus has existed for a considerable time, the oxymuriate of mercury is frequently absorbed, and the mouth becomes affected in the same manner as if the mercury had been absorbed into the system

by rubbing it into the skin, or taking it into the stomach. This proves that old granulating surfaces have the power of receiving by absorption a fluid of this description.

I have known what is commonly called the black lotion, which is composed of the liquor calcis, and the submuriate of mercury, when applied to the surface of ulcers, produce an effect upon the mouth in persons who are easily affected by mercury. I believe that the lotion of the liquor calcis and calomel often produces good effects in sores, by the mercurial action which it excites in the system, and not merely by its local effects on the sore to which it is applied. Ulcers are, however, frequently the means of producing baneful effects upon the constitution, by the readiness with which they absorb some substances which are applied to them. Thus, arsenic applied to the surfaces of sores is very frequently absorbed into the system; and on this account arsenic is to be regarded as a very dangerous remedy. With respect to the use of arsenic as an internal or external remedy, it ought never to be employed without extreme caution, and unless the patient is watched from day to day.

Case. — I remember a case, in the other Hospital, of a patient, who was brought in with a fungus in the eye, and who was under the care of Mr Lucas, a man of skill in his profession, and the father of the present surgeon of that name. Mr Lucas ordered a solution of arsenic to be applied to the part. After it had been used for three days, the man complained of pain in his stomach; but this was not supposed to arise from the use of the solution. The application was continued; the pain in the stomach became excessive; convulsive tremors of the muscles succeeded, and the patient died. It was quite clear that he died from the influence of arsenic in the

system; and, upon examination of the body after death, the stomach was found in the highest degree inflamed, and exhibiting the peculiar appearance which is produced by arsenic, and not by poisons generally. I believe, therefore, that this person died from the application of the arsenical solution.

Quacks are in the habit of destroying tumours of the breast by the use of arsenic. Women will undergo any torture which is not inflicted by a knife, rather than submit to an operation that would not give them a tenth part of the pain which they suffer from such applications. They apply to a person who tells them of a number of cures he has performed by means of a specific used for the purpose of destroying cancerous affections; and indeed they very frequently destroy the part and the patient too. Mr Pollard, the surgeon, told me of a person, in town, who applied an arsenical preparation for a scirrhus affection of the breast, and the patient died in less than a week.

I had myself occasion lately to perform an operation for a scirrhus breast, to which arsenic had been applied. I asked the woman, which gave her most pain, the application of the arsenical preparation, or the operation. She replied, that the pain of the operation was not greater than that of the application, and that the arsenic had been applied ten or eleven times. These remedies become absorbed and produce derangement of the stomach, the intestinal canal, and the nervous system, and sometimes paralysis.

Case.—While I am on this subject, I will mention a case to you, which I should scarcely have believed if it had not come within my own knowledge, that of Sir Wm Blizard, and of other surgeons. A person in this metropolis happened to have bow shins. A part of his duties was to teach young ladies to

draw and paint; and in the prosecution of this branch of his profession, he found his bow shins, as he himself declared to me, a very great evil. He felt that his merits were less appreciated, and his instructions less kindly received, by reason of the convexity of his shins; he was persuaded, in short, that his bow shins stood between him and his preferment. Under this impression, he went to a very noted person in this town, and said to him, 'Pray, Sir, do you think you can make my legs straight?'—'Sir,' said the Doctor, 'I think I can: if you will take a lodging in my neighbourhood, I think I can scrape down your shins and make them as straight as any man's.' A lodging was taken; the father of the patient assisted in the operation; and the father and the Doctor took a turn in scraping down the convex shins.

A great deal of rasping was required; an opening of very considerable extent was made in the shin, and an instrument, which was at that time contained in the Surgeon's trephining case, called a *rougée*, was employed to scrape the shin bone. When the Doctor was tired of rasping, the father took a spell. At last, the shell of the bone became so thin, that the Doctor said they must proceed no farther with that leg. The other leg was then rasped in a similar manner, and thus large wounds were produced in both of the shin bones. The surfaces granulated very kindly, and very little exfoliations of the bones took place; but, unluckily, in a part of this process the Doctor applied arsenic upon the limb. It was in consequence of the effects of this application that I saw the patient. The arsenic was absorbed into the system, and he became paralytic in his arms and lower extremities. A great number of exfoliations took place in his legs; and he showed me a box in

which the exfoliations were contained. I recommended him to go into the country, where he stayed for some time, and got rid of his paralysis. This case made a great noise in town; and there were some surgeons who expressed a strong wish to prosecute the doctor. I recommended, however, that no steps should be taken until I had seen the patient himself; and when he next came to me, I asked him whether he thought his legs improved, and if he would undergo the same operation, at a similar hazard of his life, to have his legs made a little straighter. He replied that he would; and under these circumstances I was of opinion, that as the young man was content, it was a folly to think of prosecuting the doctor. Some time has elapsed since the case occurred, and the transaction is now almost buried in oblivion. The person who underwent the operation still lives, and is pleased with his improved legs; and the doctor lives also, and is well known to most of you, at least by name.

Opium, when applied to the surface of sores, is very readily absorbed into the system. I believe that it is often a very useful application to the surface of wounds. A case of tetanic affection happened in a child, whose leg had been amputated by Mr Lucas, the late surgeon of Guy's, and the application of opium to the stump gave more immediate relief than I ever remember to have witnessed. It relieved the spasms, and, as I believe, saved the child. If opium, applied to the surface of sores, be absorbed into the system, it produces excessive costiveness, extreme pain in the head, and torpor of the system, which is only to be removed by the frequent administration of active purgatives. The effects on the constitution, when thus absorbed, are very much the same as when it is introduced into the stomach.

I have known a solution of opium, applied upon an extensive scald in a child, destroy it.*

Granulations sensible.—Granulations possess nerves as well as arteries, veins, and absorbent vessels. They are sometimes extremely sensitive; but this is far from being the case in all granulations. We shudder at seeing a person handle a sore roughly, supposing that it must give the patient extreme pain. Granulations which spring from parts endued with great sensibility, as the skin, are indeed extremely sensitive; but many granulations, such, for instance, as those which arise from bones, have no sensibility. If ulceration be produced to a considerable extent, on an exposed bone, and granulations arise, a probe may be put into them, and the patient is quite insensible of your touching him; but if you apply the probe to the edge, or near the edge of the wound, he will feel it. Granulations, therefore, springing from bone, in an uninflamed state of the bone, are not sensitive. Those, however, which spring from the cancellated structure of the bones, are, sometimes, extremely sensitive. I have, at present, a patient who had a compound fracture of the leg; the fracture was attended with abscess, and a small exfoliation of the bone took place. In this case, when a probe is put down into the cavity, the granulations from the cancellated structure of the bone are highly sensible.

When the inflammation passes away, the sensibili-

* I have seen a temporary amaurosis produced in two cases, by the application of the extract of belladonna to the surface of irritable ulcers of a malignant character. In one case, the disease was situated in the vagina, and in the other in the rectum. The pupils of the eyes were extremely dilated, as from the application of the extract to the organ itself, and the patients were incapable of distinguishing any objects for some hours. In the case of ulcerated vagina, I repeated the application, when it produced exactly similar effects.— T.

ty of the part is diminished. The same thing happens with respect to granulations, springing from tendons, as the tendo Achillis, for instance, which are perfectly insensible. So granulations arising from fascia, and the aponeurosis of muscles, are endued with little sensibility. In general, therefore, although granulations springing from parts possessed of great sensibility, are exquisitely sensitive; those arising from parts in a great degree insensible or entirely so, as tendons, are not sensitive: a circumstance which you may have an opportunity of witnessing any time you visit these large hospitals.

Granulations readily unite. — Granulations very readily unite with each other. The mode in which union is effected, is, by bringing the edges of the two granulating surfaces together, so as to produce the adhesive process. The surface of the granulations is covered by adhesive matter, and you have only to apply the two surfaces to each other to produce an union. The knowledge of this principle is very often useful in the practice of surgery. A man has a considerable portion of the scalp raised from the skull, and the pericranium throws out granulations, whilst the raised portion of scalp is also granulating. Instead of waiting for the tedious process of granulations filling the cavity, you have only to place one portion of the granulations upon the other, bind them well down with adhesive plaster, and they will often inosculate. In this manner a surface, which it would otherwise require a long time to close, will be healed in a few days. The cavity of the scrotum, after removal of a testicle, is often covered with a great number of granulations; yet by bringing the surfaces together with adhesive plaster, a wound which would otherwise require weeks in granulating, will be healed in a very short time.

It was upon this principle, namely, that of bringing together granulating surfaces, that Mr Baynton proceeded with so much success in the treatment of ulcers; so that our hospitals are now much less filled than they formerly were with those opprobria of our art.

OF CICATRIZATION.

The next subject to which I shall direct your attention is, the closing of sores by cicatrization. The formation of new skin with which a sore is covered, is called cicatrization, which takes place in the following manner.

Mode by which it is produced. — The vessels at the edge of the skin form granulations, and these unite with the granulations of the surface of the sore; those produced from the edge proceed towards the centre, and inosculate with the others on the surface of the sore, and are united by the adhesive process. The vessels become elongated from the edge of the sore, and proceed in radii from the circumference to the centre. Day after day an addition is thus made to the cicatrix, until at last the vessels reach the centre from every part of the circumference, when the process of cicatrization is completed.

It may be said by some persons, that this is not the only mode which nature takes for the formation of new skin, for it often happens that the process of cicatrization commences from the centre of the sore. If these persons mean to say that insulated portions of skin are sometimes seen in the centre of sores having no communication with its edges, there can be no doubt of the fact.

But how does this happen? It is not that the centre of the sore has the power of forming new skin, but that the new skin in the centre is produced

in consequence of the whole of the original skin not having been destroyed, and granulations arise from the part of the skin which was left. This happens in irregular formed sores, where the healing process has gone to the centre, and then the sore has broken out in the circumference. If granulations arise from any portion of skin in the centre, these granulations form new skin, and an insulated portion of skin is produced, forming a part of the cicatrix.

Appearance of a newly formed cicatrix. — When a cicatrix is at first formed, it is extremely vascular; but if it has existed for any length of time, the blood vessels become contracted, and it is whiter than the original skin. Hence the white appearance of the cicatrices after small-pox; for, although they are more vascular than the original skin, when first formed, in a little time they lose their vascularity, and are endued with less living power than the surrounding parts.

Time in which an ulcer becomes cicatrized. — The readiness with which the surface of a sore is covered in by cicatrization, depends very much on its form. A sore of a circular form, requires a very considerable time before it will heal; whereas a sore of much greater length, but of less diameter, will heal more quickly. You may always pronounce, therefore, that a round sore will be longer in healing than a longitudinal, *cæteris paribus*. The reason is, that the vessels have to elongate much less from the edge to the centre in a longitudinal, than in a circular sore. The form of the sore, therefore, has an influence on the readiness with which cicatrization takes place.

Sores are very often difficult to heal from their situation. Thus, if a sore be situated at the back of the leg, there will be often great difficulty in healing it. Indeed such a sore can only be healed by

raising the heel, and so loosening the skin, in order to give it a power of being drawn in to form a new cicatrix. By this means the vessels are more readily elongated, and continually draw the skin nearer the centre of the sore. It appears, then, that the form and situation of the sore have a very considerable influence on the healing power. Where there is much loss of skin, ulcers heal with great difficulty, because the skin must form from the edge to cover the sore, and the edges will not easily draw in.*

Contraction of cicatrices. — After the cicatrization of an extensive sore, more especially when it has been produced by a burn, the new formed skin contracts, occasioning great deformity; and if near a joint further mischief ensues from its motions becoming impeded. Here is a model, representing the case of a patient who had been severely burnt, and in which extensive deformity had supervened on the cicatrization of the wounds. The chin had become united to the breast, the arms to the sides, and the upper arm to the fore arm.

Now some of you might be induced to exclaim, How abominably inattentive must the medical man have been who had the care of this patient; for all these consequences might have been prevented. If you said this, your censure would be culpable; you have no right to say so; for it is a case which might happen to any of you. Deformities of this kind generally arise after the process of healing is completed; they are the effects of the contraction of the

* The process of cicatrization is extremely slow on ulcers situated in those parts of the surface which become folded, or of which the position frequently varies from the motion of joints, as in the groin from the motions of the hip, in the ham from the motions of the knee. It is from the constant disturbance of the granulations; and on this account extensive sores in the groin, more particularly, are extremely difficult to heal. — T.

cicatrices. Here the skin is contracted, so as to pull down the chin, and evert the lip, so that the saliva runs over the surface of the breast, and is constantly excoriating it. All these results proceed from the contraction of the cicatrices. I say this, from having seen, among many other cases of the kind, that of a child, who was admitted into Guy's, in consequence of the contraction of cicatrices, the upper arm adhered to the fore arm; and the thumbs were drawn back so as to be immovably joined to the fore arm.

Case. — I will mention another case. Some time ago a young gentleman, who was playing with gunpowder, happened to be slightly burned in the forehead. His father, who was a very intelligent man, showed considerable anxiety, and expressed his apprehensions at the time that some horrible deformity would arise from this accident; for he had himself witnessed instances in which the eyebrows had been drawn up, so that the patient had no power of closing his eyes, from a similar cause. Granulations, however, very soon arose on the surface of the forehead; the sore healed kindly, and the father was delighted to witness as he supposed the favourable termination of the case. Some time after, however, I saw this gentleman; and upon inquiring after the child, he told me, that he was very well, but that a deformity had ensued from the accident; the eyebrows were drawn up, the eyelids elevated, and the forehead was wrinkled. This took place a few weeks after the healing of the sore, in consequence of the contraction of the cicatrix; and unfortunately it was a deformity incapable of being remedied by any means which art could suggest. I have never seen a case like that represented in the plaster bust on the table, where the chin is united firmly to the breast, which was capable of being cured. There are some parts of the body, however, in which de-

formities of this kind may be removed; as in cases in which the thigh is united to the abdomen; where the bridle of skin may be divided, and the joint afterwards straightened; but where the bridle is broad, and not separated from the muscles, as under the chin, no operation will avail.*

Parts reproduced.—In the formation of cicatrices, the original parts may all be reproduced, except two. In the first place, new skin, though differing somewhat in texture and smoothness, is still a substance similar to the original skin. Skin may be defined to be a substance producing rete mucosum and cuticle. Are both produced by the newly formed skin? Undoubtedly. The cuticle is produced very quickly; and with respect to the rete mucosum, or colouring matter of the skin, a little time elapses before it is formed, but it is reproduced, as the following fact will show. The new skin of a negro does not become white as in Europeans, but is at first red, and after a time turns blacker than the original skin. I was struck with this in Guy's Hospital, in the case of a negro, who had been a sailor on board a privateer, and had received wounds in several parts of his body. I observed that the cicatrices were darker in colour than the original skin. We may conclude, therefore, that the skin which is reproduced is true skin; that the cuticle is very quickly reproduced, and the rete mucosum after a longer period. The cellular membrane is also reproduced, although it has at first the appearance of a solid fibrous mass which requires some time before it is drawn into the reticular texture of the original membrane. Tendons

* When the cicatrix is not very extensive, and is producing much deformity, or impeding the motions of a joint, Mr Earle has proposed that it should be removed by the knife, and a case is related in the fifth vol. of the Medico-Chirurgical Transactions, in which he performed this operation with success.

are very easily reproduced. If the tendo Achillis be divided in an animal, it will be reproduced in about a fortnight, or three weeks; but it will be of greater size than the former tendon. The same takes place in the human subject; as you may see from two specimens in our Museum, of the tendo Achillis, which had been reproduced, and which are larger than the original tendons. Every body knows that bones are reproduced; not only the shell of the bone, but the cancellated structure; not only the salt or phosphate of lime, but the cartilaginous substance, in which it is deposited. Nerves are also reproduced, but there is some doubt whether the restoration of sensation is assisted by anastomosis. Dr Haigh-ton made an ingenious experiment with respect to the union of nerves. He divided the par vagum, or eighth pair of nerves, in a dog, on one side, and let the animal live for some time; he then divided the par vagum on the opposite side, and after suffering both nerves to unite, he then divided them at the same time, when the animal died.

In 'tic douloureux,' after the operation of dividing the nerve, even when the sensibility of the part to which the nerve was distributed is not entirely restored, and although numbness still remains in the cheek, the painful sensation still returns. An old gentleman from the neighbourhood of Bury, in Suffolk, had undergone the operation of the division of the nerve for 'tic douloureux' several times. When he came last to me, there was still numbness remaining in the lip, yet the pain of the 'tic douloureux' was as great as ever. I divided the nerve, but the operation did not afford him the same relief as before. He came again some months after, and wished the nerve to be again divided. The pain in the part had returned to its former degree, although the numbness of the lip was much greater than before.

Parts not reproduced.—The parts of the body which are not reproduced, are, First, muscles. In the case of a man, who had a scar in the fore arm, which appeared to have long existed, I found, instead of muscular fibre under it, the tendinous structure I now show you. A muscle when divided united by tendon in this case, and not by muscle. Secondly, the cartilages of the ribs unite by bone, and not by cartilage. Here is a specimen of cartilage of the human ribs which had been divided, and in which ossific union had taken place. This, however, will depend, in some measure, on the age of the person; for in very young subjects cartilaginous union will be produced, but in persons more advanced in years, the cartilages of the ribs unite by bone.

LECTURE VIII.

ON ULCERS.

IN treating of this subject, I shall first describe the appearance of ulcers in what may be termed their healthy state: I shall then detail the several circumstances which render their cure difficult, and proceed to point out to you the various remedies which they require under their different modifications.

Definition. — An ulcer may be defined to be a granulating surface secreting matter. When an ulcer is in a perfectly healthy state, the appearances which it exhibits are as follow: The granulations are of a florid hue; their blood vessels possess a considerable quantity of arterial blood, and the freedom of circulation produces this florid appearance. The granulations are equal on the surface of the sore, rising a little above the edges; for it is necessary, in order that a sore should heal kindly, that the surface of the ulcer should be a little more elevated than the surrounding skin. The surface of the sore secretes matter which has a milky appearance, or rather the appearance of cream. The edge is granular, and adapts itself to the surface of the ulcer. In this manner the granulations which spring from the surrounding skin, are well approximated with the circumference of the sore, so that the granulations on the surrounding edge unite with those on the surface. When, therefore, the surface of an ulcer is red, the granulations equal, rising a little above the edge, surrounded by a discharge of healthy matter, and the edge of the sore is nicely adapted to the

surface, you will say that such an ulcer is in a healthy state. In order to produce this state of the sore, the best practice which you can generally pursue is, to apply poultices and plasters.

Principles of treatment.—When an abscess is opened, or a wound is produced which cannot be healed by the adhesive process, the best application for the purpose of exciting the growth of granulations, is a poultice. This poultice must not be too warm; as it is, by its gentle warmth and moisture, to encourage such a degree of action, as may promote the growth of the granulations, and form a soft bed into which they may spring. When the granulations have risen to the edge of the sore, this practice must be altered; and it becomes our object to adapt the granulations of the edge to those of the surface. For this purpose adhesive plaster, or unctuous substances, are employed, with a view of pressing down the granulations of the edge of the sore on those of the surface, so as to make them unite. These are the means to be adopted in the cure of ulcers. We first encourage the growth of granulations by the applications of poultices; and when the granulations have risen to the edge of the surrounding skin, we press down the granulations of the edge on those of the surface.

Such are the principles of treatment applicable to ulcers in the healthy state. We will now proceed to consider the impediments which frequently occur to the healing process, and which render a different mode of treatment necessary.

Impediments to the healing process.—The first circumstance which renders the cure of ulcers difficult, is the *too prominent state of the granulations*, producing what is vulgarly called, proud flesh. In this state, the granulations rising considerably above the edge of the surrounding skin, are necessarily pre-

vented from uniting with those of the edge. In order to prevent the continuance of this state of the sore, the common treatment is, to apply dry lint to the centre of the ulcer, and some unctuous substance to the edges. The lint, by its pressure, prevents the growth of granulations in the centre, while the unctuous substance allows the granulations on the edge to proceed, and inosculate with those on the surface of the sore. The lint should not be applied to the edge; for if it be, the granulations will be prevented from proceeding towards its centre. The nitrate of silver, and the sulphate of copper, are employed for the purpose of destroying luxuriant granulations near the edges of the ulcer. Lint is, therefore, applied to the centre of the sore, for the purpose of keeping down the granulations on the surface; whereas the caustic is applied on its circumference, to check the too rapid growth of the granulations which are nearest the edge of the sore. Thus the healing of the sore is promoted, and a little circle is formed by the caustic from day to day, until it arrive at the centre.

Adhesive plaster is also used to press down the granulations. The common adhesive plaster is, however, too stimulating for this purpose; a plaster composed of equal parts of the *emplastrum thuris compositum* and the *emplastrum saponis*, is a much better plaster to promote the healing of ulcers, than the common adhesive plaster. This is a point deserving attention; because if the application is of so stimulating a nature as to excite inflammation, and excoriate the skin, we are often under the necessity of abandoning its use. It sometimes happens, that the action is so great as to oblige us to apply a sheet of lead to the surface of the sore; when this is necessary, you may apply, first, a piece of lint covered with the *ceratum cetacei*, over this a piece of sheet

lead, which should be confined by a roller. These are the various modes of treatment in this state of the sore.

Granulations languid. — The next circumstance to which we shall advert, as giving rise to difficulty in the treatment of ulcers, is a *languid state of the sore*, in which its action is deficient. What is the character of such a sore? You may know that it is in this state, by the glassy and semi-transparent appearance of the granulations; instead of the florid hue which characterises granulations in their healthy state, a considerable portion of them is bloodless. The fact is, that the heart and vessels of the surrounding parts have not sufficient power to throw the blood to the surface of the granulations.

To remove this buffy appearance, and produce a healthy state of the sore, the application most commonly used is the unguentum hydrargyri nitrico oxidi. This is a strong stimulating application, which occasions a determination of blood to the part, and produces a florid redness in the granulations, instead of the semi-transparent appearance which they assume in the languid state of the sore. It produces, however, a white appearance in the edge of the sore, arising from the thickened state of the cuticle, which prevents the growth of the granulations on the edge. This may be corrected by the application of the unguentum hydrargyri fortius to the edge of the ulcer.

Lotions are frequently applied with the view of stimulating these languid sores; such as the sulphate of zinc, in the proportion of two grains to one ounce of water; or the sulphate of copper, in the proportion of one grain to an ounce. The oxymuriate of mercury and the liquor calcis are also used, for the same purpose, in the proportion of one grain to an ounce. In addition to these applications, it will be

necessary to bind up the sore with a roller, and to allow the patient to take exercise, to produce action, and to excite a healing disposition in the sore.*

It will be highly useful in these cases to employ some stimulating plaster, such as emplastrum galbani compositum, for the adhesive plaster will not always answer the purpose, when sores are languid, and the object is to increase the action in the part: this will also be greatly assisted by giving the patient a nutritious diet, allowing him, at the same time, to take exercise; and, in fact, doing every thing to improve the constitution.

The inflamed ulcer we shall next describe. When the surgeon goes round the hospital on the first day after the admission, he will meet with a number of persons with inflamed ulcers on their legs; and what is the character of these sores? There is a discharge from these wounds, composed of serum, and the red particles of the blood, with a disposition in many cases to slough; the surface is covered with a brown incrustation, and the skin and surrounding parts are highly inflamed.

You will find that the same treatment, which is applicable to inflammation in general, will be of service in these ulcers, where inflammation has existed

* I have a great objection to the application of ointments to ulcerated surfaces, and scarcely ever employ them, for the following reasons. In many cases the grease of ointment creates irritation, which is proved by the good effects resulting from the application of a lotion, possessing the same medicinal properties, as an ointment which has previously caused irritation. When an ulcer is deep or irregular, it is difficult to place a dressing of ointment in contact with its whole surface, consequently it only acts partially, and besides, by adhering to the edges of the wound, and the surrounding parts, much time is necessarily required at each dressing to remove it.

Lotions will effect every thing that can be done by ointments in these cases; they have the advantage of being readily applied to the whole surface, and are more cleanly. — T.

for a long time to a high degree. Rest must be enjoined; and the patient must be kept in bed, in the recumbent posture. Fomentations and poultices should be employed; fomentations will tend to produce a secretion from the part, and poultices to promote the growth of granulations. With these applications the vessels begin to shoot, the sore assumes a better aspect, healthy secretions are thrown out, and granulations form, fibrous matter is deposited, and in a little time you will have the skin cover the wound. Fomentation, poultices, rest, and the recumbent posture, must be enjoined, and the patient be freely purged; the best cathartic that you can administer is calomel and compound extract of colocynth, and a draught of the infusion of senna and sulphate of magnesia on the following morning; by this plan you will do more to subdue the inflammation, than by any other that I know.

If the part in the neighbourhood be much inflamed, leeches had better be applied near the circumference of the ulcer; with this treatment, in a few days granulations will spring up, pus will be secreted, and the surrounding edges will assume a healthy appearance. Without, however, attending to the constitutional treatment, all your local applications will be of little avail.

Of gangrenous ulcers. — This kind of ulcer is very frequent in a man who has been in poverty and distress for a long time, walking the streets of London, looking for an asylum where he may rest his head: this person, at last, comes to an hospital, in a reduced and emaciated state, with a gangrenous ulcer. When you see a wound of this description, you will know it by the surface being free from discharge, the surrounding edges of a livid appearance, with small vesicles or blistered spots on them, and the patient suffers much from irritative fever; seeing

this state of the wound, you enjoin the patient the recumbent posture, which is essentially necessary to promote separation of the dead parts.

The principle of treatment in these cases is, to produce a very slight increase of action in the part; previously, when the action is excessive, you must, on the contrary, soothe and tranquillize; both will be, therefore, good in different stages. When there is debility, slight stimulus should be employed; but when there is excessive action, stimulus must be avoided.

The best application to produce a slight stimulus, and check gangrene, is the nitric acid; there is none equal to this: fifty drops of it to a quart of distilled water will be found a most useful remedy, the acid may be increased to a drachm; this may be done or not as it gives pain, but generally the average strength is fifty drops. I have seen, in a short time after this application, a quick separation of the parts from sloughing, to which there is always a tendency; and healthy granulations spring up, being, as the chemists would call them, highly oxygenated. The granulations are of a beautiful florid red.

Oiled silk should be applied to the wound, to prevent evaporation, and preserve the moisture of the linen for many hours. An advantage, though a slight one, compared with the others, in the use of the nitric acid is, that the offensive smell is nearly removed by it. Another very good application to sores of this kind is nitre, in the proportion of one drachm to a pint of water; this agrees very well with the sore, and has the same effect with the nitric acid, though in a diminished degree. Sulphuric acid is of use also in these cases, six drops of the acid to four ounces of water; the muriatic acid has not the same effect as the other mineral acids. If ni-

tric acid be applied to the wound, the granulations will assume a red and healthy look ; if the sulphuric, they will have nearly the same appearance ; but if the muriatic acid be put to the wound, it will have a comparatively slight effect on the granulations, and therefore it is an inferior remedy in the treatment of ulcers. Port wine, porter, dregs of beer, and yeast, made into a poultice, are also useful.

You must have recourse to a great variety of applications ; for after you have tried one, which at the beginning was useful, you will, from the wound becoming accustomed to its stimulus, be obliged to change it for another. There is, at this time, a girl in the other hospital, with sloughing of the pudendum ; a variety of means have been used, each of which, at the outset, relieved her a little, but did not continue to do her good for any length of time, and she will, most probably, in the end fall a victim to the disease ; it is upon this account that I mention so many remedies. The carrot poultice is also a very good application. The constitution of the patient must be attended to, or the local means will do very little ; therefore, local applications must be aided by constitutional remedies, and the best medicine that you can administer is opium with ammonia—twenty drops of tincture of opium three times a day, with ten grains of the carbonate of ammonia in an ounce and a half of camphor mixture, and a little of the compound tincture of cardamom.

This is the medicine which will agree best with the patient ; he must be well nourished, or at least he must have as much as his digestive powers will bear ; port wine must also be given, and spirits may be allowed to those who have been addicted to their use : by brandy and opium I have seen these sores cured ; in fact, they are our sheet anchors in

the treatment of these ulcers. But I shall have to speak of this again in the Lecture on Gangrene.

Irritable ulcer. — The next kind of ulcer is the *irritable*. This sore is extremely difficult of cure. How are you to know it? When you find the granulations most unequal; in some parts being very high, in others depressed. The discharge from the wound consisting of a bloody pus, which is pus mixed with the red particles of the blood. This sore, then, may be known by the inequality of the granulations, the nature of the discharge, and the great pain and tenderness in the part; so that the patient is like a sensitive plant, shrinking from the slightest touch. As you will find considerable difficulty in the treatment of these sores, I will tell you the best application that you can use: a compound of cetaceous ointment, mercurial ointment, and powdered opium, agrees well.

R. Unguent: cetacei.

Unguent: hydrarg: mit: āā ʒ ss.

Pulv: opii: ʒ j M.

Fiat unguentum.

This must be spread on lint, and applied to the part twice a day.* The internal remedies you

* In these cases I usually employ a lotion, composed of lime water, mucilage, and opium, in preference to the ointment, for reasons I have before mentioned. As a general remedy to irritable ulcers, I can with confidence recommend it strongly, as I have had ample opportunity of witnessing its good effects. It is applied on lint or soft linen to the ulcerated surface; and a portion of oil silk, or a light poultice, is placed over it, to prevent the lint from drying. In preparing the lotion, the opium must be dissolved in the lime water, and the solution is then to be filtered, to get rid of all extraneous particles, after which the mucilage is added: the proportions are as follow:

R. Liquor. calcis ℥ j.

Extract. opii: ʒ j.

Mucilag. acaciæ ʒ ij. M. fiat lot.

ought to exhibit in these cases are calomel and opium: these are the medicines on which you are to rely: a grain and a half of calomel, and a grain of opium, morning and evening. Nothing will be of so much service as this medicine. It should not be carried so far as to produce ptyalism, or to affect the constitution severely; but it should be given so as to restore the secretions, and to diminish the excitement of the nervous system. The calomel will do the first, and the opium will lessen the nervous irritability. The treatment of inflammation has been improved of late, by exhibiting calomel and opium. The effect of this medicine in inflammation may be seen in the disease called iritis. Here calomel and opium must be exhibited: nor should a deposit of adhesive matter into the anterior chamber of the eye, be any bar to their use. Give five grains of calomel and a grain of opium night and morning; and in the space of a week, if the eye has not suffered so much as to be disorganized, this remedy will correct the inflammation, and vision will be restored.

We use other remedies, such as the compound decoction of sarsaparilla. Some think it a placebo; others have a very high opinion of its efficacy. I do not think much of it myself in these cases; but after the use of mercury it diminishes the irritability of the constitution, and soon soothes the system into peace. With this view, its aid, combined with other remedies, may be here of use. Before I conclude this part of the subject, I will mention a case which just occurs to me; I allude to that of Mr Lucas, the surgeon of the other Hospital. That gentleman, in consequence of having pricked his finger, had a very irritable sore, which obliged him to go into the country, where he remained for a considerable time. The remedy which he found

most efficacious for bringing the sore into a healing state was the application of a solution of nitric acid, very much diluted; and he took the compound decoction of sarsaparilla. From the latter he thought he derived considerable benefit. By these means, and by attention to his general health, he effected a cure; but his life was in considerable danger from the irritable sore, produced by an apparently trivial accident.

Sinuous ulcers. — Whenever a sore extends to any considerable depth, and the discharge has to travel through a channel before it arrives at the surface, such an ulcer is called sinuous. There are two reasons why these ulcerations are difficult to heal: first, from matter forming at its extremity, forcing its way through the passage, and thereby disturbing the healing process, by breaking down whatever adhesions and granulations form on its sides; and, secondly, the same interruptions occur from the actions of the muscles, when these ulcerations happen in muscular parts; thus, if the healing process has commenced in fistula in ano, when the sides of the fistula are at rest, the first time that the person has a motion, the sphincter ani, by its action, will destroy the newly-formed union; consequently, if the sphincter be divided and the parts have rest, granulations will form, remain undisturbed, and a cure be the result; and this clearly shows that the motions of the sphincter occasion a continuance of the evil.

Sometimes in these cases, to excite the adhesive inflammation, injections of tinctura lyttæ are used; it readily produces inflammation; adhesive matter becomes thrown out; and if you take care to keep the sides of the sinus in contact by these means, the parts will permanently coalesce. Sinuses of the rectum, however, are seldom cured without operation; indeed, I have met with but two such cases;

one was that of a gentleman who came from the north of England; he had been annoyed by a fistula on each side of the anus, and one of which was operated upon by Mr Hey, of Leeds; he was cured on that side by the operation; but as it was attended with some loss of blood, the patient was too much frightened to be cut again, and he came to town for advice. I examined him, and finding that there was considerable space between the anus and the fistula, I advised him not to submit to an operation, and said that I would try to relieve by injection. I injected first Port wine and water: this did not answer; it was not sufficiently powerful. Port wine alone was used, and succeeded in obliterating the canal. I was fortunate in this instance; for I can assure you, that fistula in ano is seldom, very seldom, completely cured without an operation. When you do not succeed by injection in sinuous sores, you may employ the caustic bougie. Still pressure will be necessary; and it is scarcely possible that you can succeed without it. When the fistula is very extensive, it may be divided into two; or a seton may be introduced, and kept in for a fortnight or three weeks, with a view of stimulating the parts, for the purpose of filling the cavity with granulations.

Extraneous bodies. — Ulcers are frequently formed for the *discharge of extraneous bodies*; when such substances become lodged, therefore, in any part of the human frame, inflammation is excited, pus becomes secreted; which pressing towards the surface, ulceration succeeds, and the extraneous substance is thus afforded an opportunity of escape. Ulcers of very considerable extent arise from the exfoliation of bone; here you can assist nature by applications which act chemically on the parts; apply, for this purpose, a lotion composed of muriatic acid and

water, or nitric acid and water: this wash will dissolve the phosphate of lime, or earthy matter of the bone, and whilst removing this inanimate substance, the action of the absorbents will be increased, and a quicker separation of the diseased from the healthy parts be the consequence. The acids, however, have not so great an influence in these cases as you might be led to expect; still, however, you will find them to be of use, and they should be employed.

Irritation from the nails growing in. — Ulcers, which occasionally form on the fingers and toes, are sometimes exceedingly difficult to heal, from an irritation caused by portions of the nails penetrating the integument. You may think this too trifling a subject to require a moment's consideration; but I can assure you it is far otherwise. A nail, for example, from pressure or some other cause, shoots into the skin beside it; a fungus springs up; the surgeon applies caustic, and destroys it; in a short time it rises again; the caustic is repeated, and the fungus disappears; it speedily, however, returns, and will continue to do so, notwithstanding all his efforts to the contrary, unless he remove the irritating cause; now this cause is the projecting portion of the nail: as soon as that is removed, or its pressure prevented, the fungus will cease to grow, and the ulcer immediately heal. The best modes to adopt for the purpose of radically relieving these troublesome affections are as follow: — Pare down the nail as thin as you can, without producing bleeding; then raise its edge a little and introduce between it and the sore a small piece of lint; in this way the irritation may generally be removed. It sometimes happens, however, that the sore is so exceedingly irritable, that even lint cannot be lodged on its surface without producing great increase of inflammation and pain;

in such cases, what I do is this : with a pair of scissors I slit up the nail on the side where the disease exists, and then, with forceps, turn back, and sometimes completely remove, the divided portion. This is a very painful operation certainly, but I have known persons get well by this treatment in ten days, when the complaint had for months resisted every other. The applications to be used after the operation are of little importance ; poultices are the best, and these will be required but for a limited period ; for the irritating cause having been removed, the fungus will soon disappear.

The next plan to be adopted, for curing these cases, is the application of a blister ; this brings away the cuticle, and often the nail with it. The most lenient method is the one first mentioned, viz, the introduction of a piece of lint. Mr Hunter, in alluding to this disease, said, that the parts were not in a state of harmony : this is very true, and a very proper expression ; he also applied it to those cases where a disease in the gland producing the nail, causes the nail to turn black : such affections are not uncommon, and are often thought to be syphilitic, and I have frequently known persons salivated for them ; this opinion, however, is perfectly erroneous : you must apply to the sore liq: calcis and calomel, and administer the pil: hydr: submur: comp: and decoct: sarsaparillæ comp:

* Sometimes, in these cases, we apply a blister, then remove the nail ; but often we are obliged to dissect out the gland that produces the nail ; and though the operation is a painful one for the patient,

* At the root of each nail a gland exists, which secretes the nail ; and under the nail are laminæ, into which the nail grows ; and by corresponding laminæ, in the under surface of the nail it adheres with extraordinary firmness.

yet we are, for the purpose of affording permanent relief, compelled to resort to it.

Whitlow. — Whitlow is an exceedingly painful swelling, terminating in an abscess by the side of the nail. The principle is this: the matter forms at first under the nail; but being unable to force its way through that horny substance, burrows under it, until it escapes at its edges, thus producing excessive pain and irritation. Fungous excrescences often arise in these cases, which induce the surgeon to apply caustic: this practice is worse than useless. You should, after fomenting or poulticing the part, remove a portion of nail; this permits the matter to escape, and instantaneous relief is the result.

Menstrual ulcer. — The next ulcer that I shall describe is the *menstrual*; I mean by this a sore, which, once in three weeks or a month, secretes a bloody fluid. This complaint is connected with amenorrhœa. In visiting the hospitals, you must have observed that females on one day have their sores healthy, and probably on the next day they are covered with blood — in fact, the menstrual ulcer is a very common occurrence. You must apply to these sores liq: calcis and calomel; give the patient the mist: ferri cum myrrhâ and pil: hydr: submur: comp: an ounce and a half of the former, twice or three times a day, and five grains of the latter every night at bed time. These medicines will generally succeed in improving the state of the constitution, by restoring the defective secretions.

Ulcers from varicose veins. — The next ulcers which I shall explain to you are the *varicose*, from varicose veins; and I shall be particular in my description, as the subject is one of importance. The veins, in different parts of the body, often become varicose; but those of the lower extremities by far the most frequently so. This condition of the vessels arises from

extreme distension, so that their sides are separated and their valves are incapable of approximating: the blood pressing in one uninterrupted column, the veins become distended and serpentine, and the valves widely separated from each other; the heart and arteries, by their powerful attempts to return the blood, soon excite inflammation, and ulceration supervenes. The most common effect produced is, desquamation of the cuticle, the whole surface of the skin covering the diseased veins is formed into a crust, and under this a quantity of serum is secreted. The first thing to be attended to in these cases is the recumbent posture: in fact, this position is indispensable; you can do nothing without it. Lint, wetted by the black mercurial wash, should be laid on the ulcers, oil silk over these, and the limb should be well and regularly bandaged, beginning at the foot. The pressure allows the valves to recover their lost action, and consequently it will be found to be highly useful. Another great benefit is derived in these cases from opening the veins; indeed, they are so distended that they may more properly be termed lakes than rivulets. If you do not open the vessels, you will find considerable difficulty in the progress of the cure. The best plan that you can adopt is to puncture them by means of a lancet, twice in the week as long as you think they require it; let the bandage be afterwards applied, and the parts kept wet by means of evaporating lotion. No danger whatever attends the opening of these veins, and very great relief will be afforded by it. If the punctures, however, at any time should not unite, but fret into ulcers, you must apply to them liq: calcis and calomel. It often happens that persons, who, for a length of time, have had the veins of their lower extremities in a varicose state, will find a great quantity of blood in their shoe; the crust, before alluded

to, coming off, is the cause of hæmorrhage, by opening the vein. Upon being called to a patient so situated, you may put him in the recumbent posture, apply a bandage, wet the part constantly with spirit of wine and cold water, and you will prevent any future bleeding.

Pregnancy is a frequent cause of varicose veins, and so is obesity.

It was formerly the practice, when the veins were in a varicose state, to tie and divide them. This plan is still pursued by many surgeons; but it is one that I have deprecated in my Lectures in this Theatre for the last eight or nine years; it is very injudicious, and fraught with great danger; therefore, let me exhort you never to adopt it. I have seen this operation prove fatal in several instances in these Hospitals; therefore I was induced to say that it must not be performed. A gentleman, at Nottingham, informed me that he had tied the vena saphena, for a varicose state of the veins of the leg of a young farmer, in other respects healthy, and the operation proved fatal. The same lamentable catastrophe occurred to a most respectable practitioner at Brentford; and this gentleman told me, that he would not again perform the operation for the world. If I were to tell you all the cases in which I have known it terminate fatally, I should recount at least eight. Another overwhelming objection to the operation is, that when it does not prove fatal, its ultimate effects are useless. If I were asked which of the following operations I would rather have performed upon myself, viz, the saphena major vein, or the femoral artery, tied, I certainly should choose the latter. When an artery is tied, the inflammation is confined to the neighborhood of the ligature; but in a vein it is very extensive, the vessel becomes exceedingly distended, the inflammation uncommonly

severe, and either extensive suppuration or mortification ensue, and death is the result.

Mr Travers has written an excellent Essay on this subject, which well deserves your attentive perusal.

Chronic carbuncle. — Ulcers are sometimes occurring in the cellular membrane, which I call *chronic carbuncle*.

When the constitution is impaired, from any cause, it frequently happens that small swellings form under the skin. At first they are red, then turn purple, and ultimately slough. The ulcerative process is slow in these cases. A white substance will soon be perceived at the bottom of the sore, called vulgarly a core; and as soon as this separates, healthy granulations will form, and the wound become healed. Constitutional treatment in these cases is absolutely necessary; for unless you improve the general health, the ulcers will not heal. You should administer aperients, such as the infusion of senna, Epsom salts, &c, and give alteratives; the Plummer's pill will be found the best medicine. For females, where great general debility has given rise to the formation of these sores, no medicine can equal in power the carbonate of ammonia. I shall have frequent occasion to allude to this. I generally give it in the following form :

R. Ammon: carb: ʒss.

Aq: menth: virid: ʒvss.

Tinct: cardam: comp: ʒss

M. ft. mistura.

If any one medicine improves the nervous system when deranged more than another, it is this. I have often prescribed it for females when in a state of extreme weakness, and its effects are truly astonishing: three table spoonfuls of the mixture may be taken two or three times a day. If the poultices

have not the effect of exciting the granulating process, you may wash the sores with the liq: calcis and calomel lotion, or gently touch their surface by means of the nitrate of silver. This state of the cellular membrane often accompanies amenorrhœa, and then the mistur. myrrhæ c ferro, and the pil: hydrarg: submur: comp: are the best medicines.*

Cutaneous ulcers.—It not unfrequently happens, that the skin in various parts of the body falls into a state of superficial ulceration, *producing cutaneous ulcers*. The best applications in these cases are, the yellow wash: ungt: hydr: nit: or the ungt: zinci oxydi. The internal use of the oxymuriate of mercury will likewise be found particularly beneficial and salutary; give it in the formula mentioned in a previous lecture, viz, in conjunction with tincture of bark; a small quantity of this mixture should be taken in a little white wine, once or twice daily, according to the age and symptoms. This medicine will be found a very valuable one, when the above-mentioned ulcerations are connected with disease of the glandular system.

Noli me tangere.—There is an ulcer often existing on the face, called *noli me tangere*. This disease has never been correctly described; the truth is, that it is an ulceration of the glands, or follicles of the nose, those small cavities from which you can squeeze sebaceous matter; the ulceration extending deeply, at last even the cartilages of the nose become destroyed. The plan of treatment to be pursued in this case, is as follows: you must prepare an ointment, according to the following prescription:

* The cure in these cases is much expedited by making a free incision through the swelling; as it allows the core, or dead cellular substance, to escape, without which the ulcer cannot be healed.—T.

- R. Arsenic oxyd.
 Sulphus flor aa 3 j
 Ungt. cetacei 3 j
 M. fiat unguentum.

Apply some of this ointment on lint, to the ulcer, and leave it there for twenty-four hours; and then remove it, a slough will separate: dress the ulcer with some simple ointment, or a poultice, and in a short time it will generally heal. If the ulcer is not deep, you may cure this complaint, without using the arsenical preparation, by painting the surface of the sore daily with a solution of the nitrate of silver.

You must be cautious, however, in your manner of using this application. A gentleman once came to me with an ulcer of the kind of which I am speaking, and which I painted in the manner described, with a camel's-hair brush. In the course of the day, when at Lloyd's, he was asked by some friends what was the matter with his nose, for they told him it was quite black; and, in fact, it was so. I was not aware, at the time, that a solution of the nitrate of silver would have produced that effect; and I merely mention the circumstance, that you may be on your guard. The nitric acid is a good application, diluted according to the irritability of the part, and the liq: calcis c̄ hydrarg: oxymuriat: produces a good effect.

Deep ulcers, having a malignant aspect, often remain in the face of old persons, without destroying life, although, from their appearance, they portend the most direful effects. To such sores the best application is, the arsenical ointment.

In gouty habits ulcers frequently form on joints, arising from inflammation caused by a deposition of the urate of soda. Persons sometimes apply with many joints open from this cause. A gentleman came to me from the country thus circumstanced:

several of the joints of the toes were quite exposed, and the cartilages of some of them absorbed. I found in each of these joints a portion of the urate of soda; therefore, when it is necessary, to increase the openings through the skin, and remove the urate of soda, that being the exciting cause of the disease. It is curious how little irritation is produced in the parts when thus affected, for this gentleman walked to my house.

Ulcers with thickened edges. — Occasionally the *thickened state of the edges of ulcers* impedes the healing process. These edges must be adapted to their surfaces, and this may be done by means of the empl: galban: comp: which will remove the indurated cuticle, and stimulate the parts to action; if this, however, should not succeed, you may use the ungt: hydr: fort: or ungt: lyttæ, or you may with a lancet scarify the edges, and this method will often succeed, when every other fails. A blister has an excellent effect.

Ulcers with inverted edges. — The edges of sores are sometimes very *much inverted*: a constitutional, as well as local treatment, is then necessary. With respect to the local, the application of nitrate of silver to the edges, and the black mercurial wash to the surface of the wound, is generally all that will be required, and the alterative medicines I have so often mentioned to you must be regularly given until the ulcer heals.

With everted edges. — Some sores have their edges very *much everted*, and this affection is commonly symptomatic of a malignant diathesis. The usual method of treatment practised in these hospitals is, to poultice such ulcers; to attend particularly to the condition of the general health, until it is possible the edges have resumed a natural and healthy state.

Thus have I passed over in review the various modes of treatment required for sores in different states; but when it is a simple ulcer only, the admirable mode recommended by Mr Baynton, of applying straps of adhesive plaster, should be had recourse to; which, by stimulating the surface, approximating the sides of the wound, and thus facilitating the processes of granulation and cicatrization, surprisingly contributes to complete the healing process.

LECTURE IX.

ON GANGRENE.

HAVING traced inflammation through its adhesive, suppurative, and ulcerative stages, I shall now proceed to consider it in its most destructive form; namely, when it exists in such excess as to produce gangrene.

We find that when inflammation is extremely violent, it occasions the destruction of the vital power of the part. At other times, when there is a less degree of inflammatory action, but the powers of the part are feeble, life will still be destroyed; so that gangrene is produced either by an excess of inflammatory action, where the powers are natural, or by a less degree of inflammation, where the powers of the part are feeble.

Definition. — Gangrene may be considered as a partial death: this is its definition: the death of one part of the body, while the other parts retain their natural powers.

Symptoms of Gangrene. — The symptoms of gangrene differ according to the manner in which it is produced. When it is the result of high and active inflammation, the pain attending its production is exceedingly severe; the inflammation is very extensive; there is a blush on the surrounding skin; and generally, though not always, a considerable degree of swelling. The secretion from any sore which may exist ceases, the surface of the skin becomes of a purple colour prior to its death, but afterwards is rather of a brownish tinge. The cuticle is raised; a vesication is produced; and when this breaks, it is

found to contain a bloody serum. When the serum is discharged, the skin assumes the gangrenous appearance, and becomes perfectly insensible. The vesications extend to parts beyond the ulceration: thus in sores of the leg we frequently see a large portion of the skin giving way, and the gangrenous vesications extending beyond the ulcerated surface.

Constitutional symptoms. — The constitution suffers considerable derangement from gangrene; there is a high degree of irritative fever, and the pulse is often exceedingly quick: it is generally said to become slow when gangrene takes place; but I have never observed this. I have indeed occasionally remarked but a few beats in a minute, because it is very frequently intermittent; still the pulse is quick: it is said also to become soft; but I should not say that this is the character of the pulse in gangrene. It is quick, very small and thready, and generally irregular.

Delirium and hiccough. — Gangrene seldom occurs without delirium, and it is attended also with vomiting and hiccough. Hiccough, indeed, is the characteristic sign of gangrene, and it takes place though the gangrene may be situated in a part very distant from the stomach; as, for example, in the toe. The fact is, that when gangrene arises from a diseased state of the constitution, the stomach is extremely disordered, and its derangement is followed by spasmodic contraction of the diaphragm, producing hiccough. This symptom does not arise from any direct action on the diaphragm, but from its sympathy with the deranged state of the stomach. If you wish to correct hiccough, you may arrest it for a time by giving some slight stimulus, or even by adopting opposite means. Thus a glass of cold water will suspend it for a considerable period. Such are the symptoms when gangrene is the result of excessive action.

Gangrene from feeble action. — Gangrene is sometimes the effect of a low degree of inflammation; as when it is produced by the application of cold. If a great degree of cold is applied to any part for a considerable time, the part will become benumbed; that is, its nervous power will be diminished; and when it is thus enfeebled, it will be unable to bear a very slight degree of supervening inflammation, and the destruction of its life will follow. In this climate, however, destruction of the life of the part does not, in general, immediately succeed. A person will come to the hospitals with his feet benumbed; he may have been wandering about the streets, unable to find a place of refuge, exposed to severe cold. Great care must be taken in these cases not to apply heat very suddenly; even the common heat of the bed frequently occasions inflammation, which is extremely liable to gangrene, in consequence of the diminished nervous influence of the part. I knew a gentleman of the first consequence in this country, whose death occasioned, perhaps, as much regret as that of any one who has died for many years, who lost his life from an act of imprudence. He had been shooting, and had exposed himself to severe cold; and finding his feet benumbed on his return, he immediately put them into warm water. The consequence was, that a gangrene took place, of which, notwithstanding every care, he died. In this climate it generally happens, that inflammation succeeds the application of cold after an interval of two or three days. By the use of some slight means of treatment, this inflammation is generally suspended; and it is by the repetition of the inflammation, rather than by its severity, that the powers of the part become, at last, exhausted. In colder climates than our own, that part exposed to cold becomes white, and the suspended circulation is commonly re-

stored, by rubbing the part with snow. If it be not very carefully treated, however, inflammation and sloughing are apt to ensue. If a part be completely frozen, inflammation frequently ensues in a short time, and after continuing for a few hours, is followed by a destruction of the vital power.

These are symptoms which we observe in cases where gangrene is the result, either of a high degree of inflammatory action, or of diminished powers. When gangrene is produced by either of these causes, the process of separation soon commences; this is one of the most curious which occurs in the human body. There is nothing more extraordinary to my mind than the power which nature possesses of separating even large members without any hæmorrhage, and with little danger to life. There is an instance at the present time, in the other hospital, in a case of popliteal aneurism, which will afford you an opportunity of judging of this process of separation for yourselves.*

Separation of the skin.—The first appearance which we observe after the destruction of the life of any part, is a white line which nature forms for the separation of the dead from the living parts; for this white line we anxiously look, since it is the barrier which nature sets up between the dead and living parts, and it becomes a criterion of the cessation of the gangrenous disposition. At this white line the cuticle is raised. This elevation of the cuticle is, a vesication which forms a line of circumvallation around the gangrene. When the cuticle becomes separated, as it will in two or three days, we find a chasm beneath it produced by the absorption of the living skin, which was in contact with the dead. The living skin is taken up by the absorbent vessels

* This man's leg has separated through the calf.

into the constitution, and in this manner the dead parts are separated by a process of nature. If we were to reason, *à priori*, on this subject, it might be expected, that the absorbent vessels would rather remove the dead portion of skin in contact with the living; but this is not the case. The absorbent vessels act on the living parts, and not on the dead; nor is the dead skin absorbed after the granulations have formed, but it becomes loose, and ceases to attach itself to the surrounding parts; the chasm formed by the absorbent vessels causing separation.

Separation of cellular tissue. — The next part which begins to separate is, the cellular tissue immediately under the skin. Gangrene proceeds to a much greater extent in the cellular tissue than in the surrounding skin, because the cellular membrane is a part of weaker living powers. It is for this reason that a sloughing disposition is so dangerous in sores extending to the cellular membrane. A small chancre beginning in the pudendum of the female, or in the prepuce of the male, will frequently occasion the destruction of life in the part. Persons have absurdly supposed, that these sloughing sores are not chancres, because they have not the common venereal character. How does this happen? if a chancre form in the pudendum of an irritable female, and has a sloughing disposition, it extends into the cellular tissue, inflames it to a high degree, and produces gangrene. In this manner the character of the chancre becomes destroyed. There is, at this time, an unfortunate female (only seventeen years of age) in the other hospital, who has lost a considerable portion of the external organs of generation, in consequence of a sloughing chancre. The hospitals teem with such cases; and indeed this deplorable result is frequent when a chancre extends into the cellular tissue, a part naturally weak, and

rendered weaker in these persons from their irritability and mode of life.

Separation of muscles. — The next part that separates is, muscle. Muscles separate nearly opposite the edge of the skin. Wherever the skin separates, the muscle gives way; a line of separation is formed, and the living portion of muscle is removed from the dead. This is not the case with tendons; these, like the cellular tissue, do not separate opposite the skin, but at a considerable distance from the part at which the sloughing happens. If a tendon be exposed in the palm of the hand, by a sloughing ulcer, it separates near the wrist; for it is incapable of resisting the inflammation, in consequence of its weak living powers, and separates, therefore, at the part where it joins the muscle.

Separation of nerves. — The nerves separate, like muscles, opposite the skin; but the most extraordinary instance of the process of separation is, that which takes place in the larger blood vessels. What would be the result, if the anterior and posterior tibial arteries were cut, without placing a tourniquet on the limb? the person would die in a few minutes. Yet nature frequently divides the arteries I have mentioned, without any blood issuing from the limb. This happens in the following manner: The blood in the vessels of the dead part becomes coagulated; the coagulum, however, does not confine itself to the dead part, but extends to the living vessels which join it, and is, in this manner, glued to the inner side of the artery by the adhesive inflammation; so that the vessels are, as it were, hermetically sealed; and not a drop of blood can escape by the side of the coagulum. The same thing takes place in veins, the coagulum adhering to the inner side of the living vein, so that no blood can escape. If you amputate a limb at a considerable distance from the part at

which gangrene has commenced, you will still find the vessels sealed. The first amputation which I ever performed, was in the case of a person who had a gangrenous ulcer near the head of the tibia. In this case it was necessary to amputate above the knee, as sufficient skin would not have been left if the amputation had been performed below. When I loosened the tourniquet, I was surprised that the femoral artery did not bleed. On a closer examination I found that the inner side of the femoral artery was completely sealed by the coagulum which had extended, at least, six inches above the place at which the gangrene had occurred. It appears, therefore, that the artery is not only sealed at the place at which nature divides it, but at a considerable distance above it, in order to provide against the danger which would arise from a separation of the coagulum.

Separation of bones. — Bones, at last, become separated; but this process is very slow, loaded as they are with phosphate of lime. Hence we are often under the necessity of taking away bones, when the process of separation is, in other respects, complete. I am anxious, whenever I have an opportunity in these lectures, to refer you to cases actually existing in the hospitals; and you cannot have a better opportunity of observing the process of nature with respect to the separation of bones, than in the case of popliteal aneurism, to which I have before directed your attention. This man underwent the operation for aneurism in the other hospital. The aneurismal bag had been loaded with fluid blood for a length of time; the process of gangrene commenced at the ankle, all the soft parts were absorbed, and there is nothing now remaining but a portion of bone, which will also separate, if we permit it to do so, by the efforts of nature alone. I knew a person in the

country from which I came (Norfolk) whose leg entirely separated by the process of ulceration. In the foot this very commonly takes place; in the calf of the leg it is not common, but below the calf it frequently occurs. I attended one of the King's messengers some time ago, who came from Germany with a gangrene in the foot. The foot separated at the tarsus, and the whole process went on without any surgical operation, and nothing but the aid of the simplest applications.

Gangrene the effect of debility. — Gangrene is frequently the effect of a debilitated state of the constitution. Thus if a man has been confined by long continued fever, the nates are apt to slough, and become gangrenous, in consequence of the imperfect circulation, arising from the position in which he has been forced to remain. Some fevers have a greater tendency than others to produce gangrene; as, for example, scarlatina.

In slight cases of scarlatina, the most horrible effects will sometimes arise from gangrene. The tonsils slough to a great extent; parts of the eustachian tube, and even of the tympanum, will separate, and large portions of bone exfoliate. The worst effects of this kind are observed in those cases of scarlatina, in which the fever is not the most violent. The measles are very apt to be followed by sloughing. In this town it sometimes happens, that a large blister applied to the chest of a child labouring under measles occasions a high degree of inflammation, producing gangrene, and endangering the life of the patient. In constitutions of an unfavourable kind, I have seen the measles produce a slough, forming an aperture through the cheek of the child, by which its food escaped, and life was soon destroyed. Mercury, if used to excess, often excites sloughing, from the fever, and consequent debility of the constitu-

tion, which it produces. Whatever, in short, weakens the constitution much, disposes it to the production of gangrene; for the body, when thus debilitated, cannot bear any excess of action.

When the application of cold is the cause of gangrene, the effects are produced very much in the same way. The powers of the part, to which the cold is applied, are diminished, and this diminution of power leads to the destruction of the part, under the first excess of action.

There are also some parts of the body naturally constituted feebly: as, for example, tendons. When inflammation attacks a tendinous structure, it runs very readily into a state of gangrene. Hence the danger of making incisions into tendons; the inflammation which follows affects the nervous system with the highest degree of irritability, and produces tetanic symptoms. It is not the injury to the nerves which produces tetanus, but sympathy with the injury to the tendon.

It may be stated, as a general principle, that inflammation is the cause of gangrene. Gangrene very rarely happens without inflammation; but as there are some exceptions to this general principle, I will mention them.

Gangrene not the result of inflammation. — I have seen, in a case of hydrothorax, a small spot on the leg become at once black, without any appearance of inflammation, and extend itself until it occupied a very large surface. Here the total absence of circulation, and not an increased degree of it, occasioned the destruction of life in the part. So we now and then see aneurism producing gangrene. In the case of popliteal aneurism, to which I before adverted, the gangrene is produced, not by the bursting of the aneurismal bag, but by its pressure on the vessels, occasioning the destruction of life in the limb

below. I saw a gentleman, a few months ago, who appeared upon the point of death from the pressure of a popliteal aneurism. His foot afterwards became gangrenous. He did not die, however; for a separation of the foot, and part of the leg, followed, and he ultimately recovered. Thus it appears that impeded circulation, without inflammation, is sometimes a cause of gangrene. The division of a considerable blood vessel will produce the same effect. A person was stabbed in the groin by a foreigner, with a dirk or sharp knife, which penetrated the femoral artery; considerable hæmorrhage took place, which was stopped by a ligature on the artery; but the leg afterwards became gangrenous, and it was necessary to amputate the limb.

Since I commenced these Lectures, I have seen a most melancholy instance of a gentleman, in the prime of life, who died from gangrene, in consequence of an injury to the femoral artery. This gentleman was thrown from a gig as he was going down a hill, and the wheel of the carriage went over his thigh. When he was taken up, it was found that he had a simple fracture of the femur. Every thing which attention and skill could do for him was done; but some peculiarities were observed at the time of the accident. The lower part of the leg was quite insensible; it was considerably swollen, and hard. After lying in bed for a week, the patient became so restless that he wished to be removed. This was done in the gentlest possible manner. He did not, however, experience the relief which he expected from a change of position, and the swelling was in some degree increased. I was then sent for; and when I saw him was surprised to find that gangrene had already commenced at the knee. This was hardly to be expected from a simple fracture; for it so rarely happens that the femo-

ral artery is injured by a fracture of the thigh bone, that amidst all the cases of fractured femur which I have seen, I never witnessed one in which the artery was injured. However, from the immediate insensibility of the limb at the time of the accident, from its coldness, from the swelling which accompanied it, and also from the pulsation which existed opposite to the fracture, I was led to believe that the femoral artery was torn through. The question then arose whether we should amputate. Upon examination, I found the limb emphysematous; the air had extended into the cellular tissue up the thigh to the abdomen, and putrefaction had already commenced. I perceived, therefore, that the patient had but a few hours to live, and that it was useless to put him to the pain of an operation. Upon examination after death, by the medical gentleman at Rochester, where the patient resided, it was ascertained that the femoral artery was divided. It seems extraordinary, when we contemplate the situation of the thigh bone, with respect to the artery, that a fracture of it should not in one case in ten produce a similar result. A little knowledge of anatomy, however, explains this circumstance. The artery is enclosed in a sheath, which so far protects it; and its elasticity yielding to the pressure of the bone, enables it to escape in a great majority of cases from being injured by this accident.

Nature of gangrene. — The nature of gangrene, as far as dissection enables me to judge of it, is this: the excessive action of the part kills the blood vessels, and the blood contained in dead vessels becomes coagulated.

This is a curious circumstance, which I ascertained by an experiment made on an animal. It is a well known fact in physiology, that if a quantity of blood be included in a living vessel between two ligatures,

at the distance of two or three inches, this blood remains rather more than three hours before it becomes coagulated. To ascertain whether, if blood were admitted into a dead vessel, from which the air was entirely excluded, it would coagulate as it would out of the body, I put a ligature on the jugular vein of a dog, and another ligature at a distance of two inches from the first; then cutting through the vein, I brought it externally to the skin, so that it hung out from the wound for six hours. Having ascertained that the blood coagulates in three hours and a quarter, in a living vessel, I took off one ligature from the dead pendulous vessel, and found that in ten minutes the blood had coagulated as firmly as it would in a cup into which a person had been bled. In a dead blood vessel, therefore, the blood becomes coagulated as it would in a vessel out of the body. If you attempt to inject a part after gangrene, the injection will not enter the vessels. There is a specimen on the table of a gangrenous limb, where you may perceive that the injection has entered only as far as the part at which gangrene has commenced. Such is the state of parts under gangrene. They can never be recovered, because blood cannot again circulate in their vessels.

TREATMENT OF GANGRENE.

We shall now proceed to consider the treatment which is to be employed to prevent gangrene, and to assist the sloughing process.

Local bleeding. — You must endeavour to soothe the inflamed parts by the application of leeches, with a view of checking the excess of action. It generally happens, in these cases, that the body will not bear any considerable degree of depletion; but local evacuations, by leeches, may be safely resorted

to. Thus, in compound fracture of the leg, gangrene may be prevented by the application of leeches, when it would not be equally safe to take blood from the arm. Soothing applications, such as poppy fomentations, and poppy poultices, should be applied to subdue the excessive action, which threatens destruction to the life of the part. It will be necessary, at the same time, to attend to the constitutional treatment of the patient. In this metropolis it is seldom safe to take blood from the arm to prevent gangrene. In the country, a different practice may be pursued; and it will frequently be necessary to take away blood in erysipelas, and other cases, in which we cannot and dare not deplete in London, the constitution of the patient being broken by intemperance, or enfeebled by impure atmosphere. When you take away blood, however, to prevent mortification, do not remove more than eight or ten ounces, lest the vigour of the circulation, and consequently the nervous powers of the constitution, should be too much diminished.

Constitutional remedies. — Two or three grains of submuriate of mercury should be given at night, with a view of restoring the defective secretions of the intestinal canal and the liver; and the liquor ammoniæ acetatis, with a few drops of the tincture of opium, should be given several times in the day. By the calomel you restore the secretions; and by the opium you tranquillize the system, and diminish the irritability which leads to the destruction of the life of the parts. Do not begin by stimulating the constitution too much in cases of gangrene. The effect of opium may, in some respects, be similar to that of taking a stimulus into the system; but it is by diminishing the quickness of action, and thus increasing the strength of the body, that opium becomes so valuable a medicine in these cases. The

best means, therefore, of preventing gangrene, are to restore the secretions ; to diminish irritability by opium ; and, in some cases, to take away very small quantities of blood.

Treatment of benumbed or frozen parts. — If the gangrene arise from the application of cold, the treatment must be different. In these cases, the action of the parts is feeble from the diminution of nervous power, and it will be proper to restore it to a healthy state by stimulants of the most gentle kind. The principle in this case is, to stimulate gently, but to moderate the stimulus by evaporation.

For this purpose the best application is the camphorated spirit of wine, accompanied by gentle friction. If you are called to a patient whose feet are benumbed by the application of cold, you must sit by his bed side, pour the camphorated spirit into your hand, and rub it on his feet with the utmost possible gentleness, so that the part may not be irritated by violent friction. When the first effects of cold are removed, it will be proper to apply poultices to the part. The poultices must be cold, for warm applications are to be carefully avoided. One of the most valuable of our nobility died of gangrene from an imprudence in this respect. He was out shooting in December last, and his feet having become benumbed, he put them into warm water as soon as he returned home. The consequence was, that his toe became gangrenous ; gangrene also occurred in the other foot, and he died from its effects. When parts are frost bitten in colder climates, you are aware that the common practice is to restore the circulation by rubbing them with snow. The friction is a stimulus, which the melting snow moderates.

Treatment when gangrene has commenced. — But so soon as gangrene has commenced, it will be necessa-

ry to apply a gentle stimulus, with a view of supporting the action of the surrounding parts which are threatened with the destruction of life. The application which is found to be most uniformly successful in such cases, is the poultice of stale beer grounds mixed with oatmeal; a poultice, thus formed, will produce a gentle and beneficial stimulus to the part, and prevent the gangrene from spreading to the surrounding skin. Spirituous fomentations are also of use for the same purpose. At the time that this local treatment is employed, means must be taken to support the constitution, which is debilitated by excessive action. The best mode of producing this effect is by the exhibition of ammonia united with opium. Seven to ten grains of the carbonate of ammonia with twenty drops or half a drachm of the tincture of opium, should be taken two or three times a day, or even every four hours. This plan will generally prevent the extension of gangrene. Bark was formerly extolled, as possessing great virtue in these cases; but it is doubtful whether it does not do as much harm as good. For the first two or three days the patient's health appears improved by its exhibition; but, after a short time, his stomach becomes loaded and oppressed: it first makes him costive, and then purges; and after a little time we are obliged to suspend its use. I am much disposed to try, in these cases, the new form of that medicine, which agrees so well with the stomach; I allude to the sulphate of Quinine. It is my intention to give it a full trial in the first case of gangrene which I meet with; and I recommend you to try it yourselves in those cases which may come under your observation. An excellent medicine used in the other Hospital, is a bolus, of five grains of the carbonate of ammonia with ten grains of musk, given every four hours. I have seen this medicine pro-

duce the best effects in sloughing sores in the foul wards, and in cases in which the gangrene was much disposed to spread. The musk has the effect of keeping up the stimulus of the ammonia, which is apt to subside after a few hours, when the ammonia is exhibited alone. We find that a change in the local remedies is often required. A Port wine poultice is an admirable application in these cases. I mentioned to you, a few days ago, the case of a girl, in the other Hospital, who had a gangrenous sore in the pudendum, where a great variety of applications had been tried without any beneficial result. At last a Port wine poultice was applied, and with such immediate good effects, that, though I had before despaired of her life, the last time I saw her, the sore was brought into so healthy a state, that there are great hopes of her recovery. Applications of turpentine also are often of use in these cases, for the purpose of stimulating the parts.

After great want of circulation in any part, from the course of the blood having been arrested, sloughing sores are very apt to occur. Thus, after the operation of tying the femoral artery, if the limb be suffered to rest in the same position for a considerable time, a small gangrenous spot frequently appears upon the heel. In such cases, the spirit of turpentine is the best application. Yest is often applied with advantage. An application, much used in Guy's Hospital for this purpose, is the formula which used to be called the *epithema lithargyri acetatis*; but now the *epithema plumbi subacetatis*.

The following is the mode of preparing it:

R.	Confect: ros: ʒ j	
	Mel rosæ	
	Tinct: opii āā	} 3 jj. M.
	Liq: plumbi subacet:	

This is an application which accords extremely well with limbs in a state of gangrene, when the dead are separating from the living parts. During the sloughing process, the nitric acid is upon the whole the best application that can be used: when the gangrene stops, and the line of demarcation is drawn, and the sloughing process is commencing, the nitric acid may be employed in the proportion of fifty drops to a pint of water. I have seen very good effects from an application composed of vinegar and the camphor mixture; about four ounces of the former to twelve ounces of the latter. This was of service when no other application had succeeded, in the case of a gentleman at Peckham, whom I attended with Mr Arnould. These are the different modes of treatment for the prevention of gangrene, and to assist the sloughing process.

Propriety of amputating. — As to the propriety of amputation in these cases, there is sometimes no occasion for amputation in gangrene when the sloughing process is proceeding favourably, as you have an opportunity of seeing, in a man in the other Hospital, in whom nature has performed the operation herself, without any assistance; if the surgeon will be content to wait a short time, and the patient be so disposed, you will find that the parts will separate without an operation. Nature adopts the very plan in her amputations which the surgeon pursues; the skin separates the longest, the muscles next, and then the tendons, together with the bones, which are left considerably shorter than the other parts, as you may observe from the specimen on the table; the bones become covered by the skin, and the muscles surround the extremity of the bone. The cases in which you are required to perform the operation of amputation are those in which the patient is unable to sustain the constitutional derange-

ment produced by the process of separation; but when the constitution is strong, the patient will bear the process required to separate the limb. You have an opportunity of seeing in the other Hospital at present, in the case to which I have so often alluded, separation taking place above the centre of the leg; there is no absolute necessity to amputate under such circumstances, and you can give the patient a chance of his life without resorting to it. In constitutional gangrene, as a general principle, do not amputate till the sloughing process has commenced, and healthy granulations are to be seen on the sore; for, if an operation be performed, the stump will assume the same appearance and become gangrenous. It is curious to see how the loss of a slight quantity of blood will destroy life in these cases. When I was a dresser at these Hospitals, during my apprenticeship, there was a case of sloughing opposite to the calf of the leg; Mr Cline, my old master, on going round the wards, said to the dresser, that the projecting ends of the bone had better be removed; there were some granulations between the bones, which, in sawing, the dresser did not observe, and he cut through them; a slight hæmorrhage ensued, and in the same night the patient died. — There was a case, in the other Hospital, in which the operation of amputation was performed; gangrene existed on one foot, a slight gangrene on the nose, and on the other foot: the leg was amputated; but the gangrene spread on the nose and foot, which, before the operation, were only slightly affected. Amputation, then, should never be performed till the constitution be in an improved state, and healthy granulations have appeared.

Gangrene from accident. — But, with respect to gangrene from diminished action, or accident on some important vessel, amputation may be perform-

ed without hesitation. A girl was brought to Guy's Hospital, who, in endeavouring to reach something from a chimney-piece, trod on the fender, which turned over and she fell on its edge : a compound dislocation of the elbow joint, together with a wound of the brachial artery, were produced ; the vessel was tied by the dresser ; hæmorrhage was arrested ; gangrene soon after appeared on the fingers, hand and fore-arm ; when, nine days from the accident, the operation of amputation was performed above the elbow-joint, and the patient's stump was perfectly healthy. A man was brought to Guy's from Woolwich with popliteal aneurism ; the aneurism had acquired great size ; a gangrenous state of the limb below forbade the ligature on the artery, and amputation was performed. Before the operation, the pulse was from a hundred and twenty to a hundred and thirty : in the evening, after the removal of the limb, I sent Mr Callaway, who was my apprentice at that time, to see how the patient proceeded : he found that the pulse had fallen to ninety ; and no amputation that I ever performed ended more favourably. Under such circumstances, amputation, instead of increasing the irritability of the constitution, by removing the cause of irritation, becomes the means of preserving the life of the patient.

OF GANGRENE IN OLD PERSONS.

Cause of gangrene.— We often find old persons afflicted with gangrene, from very slight causes ; the action of the heart being naturally weakened by age, the circulation becomes extremely languid in the feet, and mortification of the toes ensues. The appearances which the parts assume are these : at first it is red and painful ; slight pressure empties it of its blood, and some time elapses before it recov-

ers its colour; the person, little alarmed, puts upon the affected part a piece of linen; in a few days the part is purple, the cuticle comes off, and there issues from the surface a sanious discharge; red streaks are now seen passing from different parts of the foot up the leg; and the glands in the groin often undergo considerable inflammation and enlargement; many of the absorbent vessels of the foot and leg becoming inflamed, produce universal redness of the diseased member. Soon after this the gangrene begins to extend, involves the whole of the foot, and passes to the lower part of the leg, where it usually stops, as it seldom reaches the thigh; the constitution becomes considerably influenced; there is some degree of fever, and the cheeks are of a fixed, florid red. This gangrene does not always destroy life, if attention be paid to the patient. It often arises from ossification of the arteries, not so much of the large vessels, as of the small. These losing their elasticity, combined with a debilitated action of the heart, give rise to the disease of which I am now speaking. The earthy matter sometimes is deposited in great quantities in large vessels, and here is a preparation where the deposition of earthy substance had rendered the popliteal artery impervious.

Cases. — I recollect some time ago a very intelligent surgeon (Mr Steele of Berkhemstead) telling me, that he thought a certain nobleman whom he was at that time attending, had ossification of the arteries of the leg, from the pains of which he complained under exercise, and that it would some day give rise to gangrene. Of which his lordship has since died.

Where ossification of the blood vessels exists, very slight causes will give rise to gangrene. A gentleman of the city, in cutting a toe nail, carried

the knife too far, and cut the quick, as it is termed; the wound soon became gangrenous and black, and in the sequel he died. I attended a gentleman, an old surgeon, who, for the purpose of getting rid of a bunion, had (most foolishly) put a lancet into it. Gangrene followed, and he died. I was lately sent for by Mr Holt, surgeon, of Tottenham, to a gentleman who, when cutting a corn, had carried the incision so deep as to produce bleeding: gangrene succeeded, but this gentleman recovered. Old persons must, therefore, be cautious; for life being almost exhausted, very little will extinguish it.

Treatment. — With regard to its *treatment*, a poultice, composed of port wine and oatmeal, or of stale beer grounds, will be found the best *local* application; and the *internal* remedies should consist of opium, combined with ammonia. You must not expect that these cases will generally recover. I have known, however, a single toe, all of them, and even a portion of the foot, slough, and yet the patient do well. In these cases you must not amputate; whether there be healthy granulations or not, do not amputate; for as surely as you do, mortification of the stump will supervene, and death quickly ensue.

The next subject of which I shall speak, is

CARBUNCLE.

Of this I shall have but little to say, as many of the foregoing observations are equally applicable to this disease.

Symptoms of carbuncle. — When carbuncle is about to be formed in any part, it is generally preceded by pain, by a swelling of considerable extent and hardness; this is occasioned by the adhesive inflammation; the surface of the tumour next assumes a lived redness, and a spongy feel; little ulcers now

form in the skin, which, from their number, give it a sieve-like appearance, so numerous are the orifices; from these a white discharge passes — this fluid resembles water and flour mixed together; and he who has seen much of carbuncle, knows the nature of the disease instantly upon seeing these orifices, and the kind of discharge which issues from them. When the little openings are all formed into one, the dead cellular membrane becomes exposed, and begins to separate, having been previously confined by the smallness of the apertures. In gangrene of the extremities, there is not this mechanical obstruction to the sloughing of the dead part. And though gangrene is generally difficult of cure, yet carbuncle usually does well, except when situated on the head or neck. Though persons recover from carbuncles of an enormous size upon the back, yet very small ones on the head or neck will often destroy: indeed I never saw a patient who recovered from any considerable carbuncle upon the head: in these cases there is effusion upon the brain, producing compression. The inflammation which attends fistula in ano will sometimes destroy the cellular membrane of the neighbouring parts, thereby occasioning an enormous quantity of the nates to slough, and yet the patient recovers.

Treatment of carbuncle. — The peculiar treatment of carbuncle consists in making upon the surface of the swelling, at an early period of the disease, a large crucial incision, for the purpose of affording the dead parts an opportunity of escaping; then apply the port wine poultice, and give the patient such stimulants as will tend to increase the vigour of his constitution; and here we shall again find opium and ammonia our most propitious remedies.

OF ERYSIPELAS.

There is something peculiar in this inflammation; and as it is much disposed to produce gangrene, I will here introduce this subject to your attention.

Its seat. — Inflammation of the skin is generally extensive, in consequence of the surface being unbroken: so that when erysipelatous inflammation invades the skin, it is not uncommon to see it run from one part to another till half the body is covered by it. Sometimes it is ushered in by fever, and sometimes not. Certain constitutions are sooner affected by it than others, and often its effects appear to be entirely local. But unquestionably it is more frequently constitutional than otherwise.

Characteristic marks. — Its characteristic appearances are, a florid skin, with vesicles, containing a secretion of an amber colour. It is seldom that the skin suppurates in these cases; the cellular membrane, however, occasionally does. It is very common for erysipelatous inflammation to terminate in gangrene. You must not consider all cases of inflamed skin erysipelas. I have often seen cases treated as such, which were only inflammation of the skin, sympathetic with wounded absorbents, and tendinous aponeurosis. In the dissection of a person who died of erysipelas in the arm, the cuticle was separated, the skin was filled with blood, and was much thickened; the cellular membrane immediately under the skin was loaded with serum, and so was that membrane in and between the muscles to the bone.

Of frequent occurrence on the head. — The head seems to be more commonly affected by it than any other part; it often succeeds the most trifling injury of the scalp; and, like carbuncle, when it occurs in

this situation, generally destroys life. I had the misfortune to lose a lady of considerable consequence from its effects, after the removal of a small encysted tumour from the head. It made its appearance three days after the operation, and all the skilful attention of Dr Baillie was unable to arrest its progress. Thus a trifling operation on the scalp destroyed life, in consequence of having been succeeded by erysipelalous inflammation.*

After a person has once had this disease, he is very subject to repetition of it; and some persons appear to be much predisposed to its formation.

It generally makes its appearance in spring and autumn, but rarely in winter, and not often in summer. Whatever renders the body irritable, predisposes to erysipelas. The slightest causes produce it after operations at certain seasons, and in particular states of the constitution; for it has often happened that the stimulating effects of adhesive plaster have produced this disease, and have led to the death of the patient.† It would appear that this disease is contagious, at least it is certainly true, that if it begins in a ward of our hospitals, several persons become affected by it, and it often extends through the hospital.

TREATMENT OF ERYSIPELAS.

In this town the following plan is pursued, and which, *for London*, undoubtedly is the best. At first give calomel, for the purpose of restoring the

* As I shall hereafter more particularly mention, I have some doubts whether inflammations on the head following slight wounds are truly erysipelalous or not.

† Equal parts of the emplastrum thuris compositum and emplastrum saponis form a better plaster than the common adhesive.

secretions of the liver and intestines, and the liquor ammoniæ acetatis with antimony to act upon the secretion of the skin, and then give the sulphate of quinine; it is a most powerful tonic, excites in the stomach a genial warmth, and often will remain in that organ when bark will be rejected.*

* I take the liberty of introducing the following case of erysipelas, as remarkable on account of the great extent of the disease, and also as showing the beneficial effects produced by the exhibition of sulphate of quinine. — July 5th, 1824, J. Hawks, æt 46, a plasterer by trade, was admitted into St Thomas's Hospital, on account of an erysipelatous inflammation of the right leg, resulting from a contusion near the internal malleolus. The erysipelas appeared on the evening of the same day on which he received the injury, and he had been previously in an indifferent state of health. When admitted, the inflammation extended nearly to the groin, completely surrounded the extremity; his bowels were confined, and he complained of heat and pricking pain in the affected limb: the constitutional irritation was also very considerable. He was ordered to take fifteen grs of the compound pill of colocynth with calomel, and to apply a spirit wash over the inflamed surface: also, to allay irritability, small doses of calomel and opium were directed to be given every night. On the following day, my colleague, Dr Elliotson, saw the patient with me, and ordered, in addition to the calomel and opium, five grs of the sulphate of quinine, five drops of dilute sulphuric acid, and two oz of water, to be taken every six hours: with an allowance of three pints of milk daily. On the 7th, the inflammation had extended a little, and vesicles had formed on the thigh: the former medicines were continued, and castor oil ordered to be taken occasionally as required. 9th. As the pulse was rather feeble, I desired he should have a pint of porter daily, in addition to the other remedies. On the 10th, the erysipelas had extended up the side nearly to the axilla, on the abdomen almost to the median line; it also covered the whole of the nates and back: a spot on the dorsum of the foot appeared disposed to become gangrenous, and he was altogether weaker. He was ordered to take the quinine every four hours, to have beef steaks daily, with another pint of porter, to continue the calomel and opium, and also the spirit wash, excepting to the foot, which was to be poulticed. 11th. The calomel omitted, as his mouth became slightly affected. 12th. To continue and have four ounces of sherry in addition. 13th.

Experiment. — My colleague, Dr Marcet, now deceased, but late a physician of Guy's, endeavoured to ascertain whether the antiphlogistic, or tonic, mode of treatment was best for this disease; therefore he put two persons into adjoining beds, having erysipelas; to one of whom, after purging him, were given tonics, and a generous diet; to the other, saline medicines, and low diet, blood likewise was abstracted from the latter; they both recovered; the former rapidly, while the latter remained in a debilitated state for a very considerable period.

Cases. — Where erysipelas attacks the lower orders of this town, who weaken their constitutions by the excessive use of ardent spirits, porter, wine, and even spirits, may be sometimes advantageously employed as remedies. Two cases of this disease which I saw in the other hospital, proved the truth of what I am now saying: a man had dreadfully severe erysipelas, his head swollen to an enormous size, and his recovery thought impossible, when it was discovered, one day, that his wife brought him

Another pint of porter was ordered. From this period he continued to improve, and he took daily beef steaks, three pints of porter, four ounces of sherry, also the sulphate of quinine, every four hours, and the opium at night; the slough on the foot separated quickly from the application of the nitric acid lotion, and the erysipelas gradually disappeared, causing a loss of the cuticle. Matter formed in the cellular texture on the calf of the leg and at the under part of the thigh; it was discharged by incision, and the parts quickly healed.

At one time the erysipelas extended from the toes of the right lower extremity, to the occiput, occupying the whole of the limb, the back and nates, and reaching as far on the abdomen of the same side as the *linea alba*.

I attribute the favorable termination of this case in great measure, to the judicious employment of the sulphate of quinine, by my colleague, Dr Elliotson, which appeared to give tone and vigor to the system, as well as to allay the nervous irritability, so constantly attending this form of inflammation. — T.

some gin. He declared that he was better from having drank it, was consequently permitted its continuance, and, to the astonishment of all, he rapidly got well. A short time after this another man similarly circumstanced, was brought into the same ward; and from the result of the above case, I directed the sister to give him spirits also; and this patient recovered nearly as speedily as the former. But it is in the debility consequent upon the first stage of the disease that this plan is to be resorted to. The local treatment of erysipelas consists in the application of camphorated spirits of wine in the first stages. When the vesications are either about to break, or are broken, powder the part with starch, and if gangrene be produced apply a port wine poultice, or the nitrous acid lotion, in the proportion of a drachm of the undiluted acid to a quart of water. Fomentations and emollient poultices relax the parts, and dispose to gangrene.*

* Mr Copeland Hutchison has advised incisions in the gangrene of erysipelas.

THERE is another form of inflammation, which I shall term *cellular*, as it appears to be principally situated in that texture. I mention it here, as it is sometimes confounded with true erysipelas, and because it so frequently terminates in gangrene. It is usually situated in the extremities, and is often produced from very trifling injury. I have seen five cases within these last two years in which it arose from slight injury to the elbow, occasioned by the persons falling on the olecranon.

Shortly after the accident, pain is experienced at the wound, and the surrounding parts become swelled, from effusion into the cellular tissue, but the integument is scarcely discoloured; this swelling extends gradually, so as to cover the whole of the extremity in a few days. Constitutional symptoms now arise, the patient is restless, anxious, and has occasional rigors, succeeded by heat; the skin becomes partially discoloured, and on these parts vesicles are formed, which burst, and expose gangrenous spots beneath: when these spots separate, the cellular

tissue is found also to be gangrenous, not only the portion thus exposed, but that likewise which is situated to a considerable extent beneath the surrounding integument. By the subsequent separation of this substance the connexion between the integuments and subjacent fasciæ, muscles, &c, is destroyed; and I have thus seen nearly the whole of the integument of the upper arm disunited from the parts beneath.

This form of inflammation differs from the true erysipelatous in the following particulars: The integument is not at first affected, nor does it ever assume the florid colour which attends erysipelas: the constitutional symptoms do not precede the inflammation, but appear to be consequent on the local affection; it also always terminates in gangrene of some portion of the cellular tissue.

The constitutional treatment is much the same as that required in erysipelas; but the local applications should be employed with a view to promote the suppurative process (unless the inflammation be quite incipient). For this purpose fomentations and poultices are proper.

If the separation of cellular tissue has been extensive, great care must be taken to keep the disunited integument in contact with the subjacent parts, otherwise it will be very likely to slough: to effect this I have usually employed strips of the soap cerate plaster, which are applied so as to leave some of the openings uncovered, to allow of a passage for the discharge, until the desired union has taken place. — T.

LECTURE X.

ON INJURIES OF THE HEAD.

THESE injuries are of the most dangerous kind from the influence which they produce upon the brain and nervous system.

The nervous system is composed of the cerebrum, cerebellum, and medulla oblongata, which principally supply the organs of sense and their appendages with nerves, and of the medulla spinalis, with the nerves of volition and sensation proceeding from it. But there is a second system of nerves in the body, called the grand sympathetic, which is distributed to the heart, and to the viscera of the abdomen: it communicates with most of the nerves of the brain, and with those of the spinal marrow: it forms by its branches a large ganglion, or several ganglia, called the semilunar, situated behind the stomach, and a plexus proceeds from this, which distributes branches to the greater part of the abdominal viscera.

The eighth pair of nerves of the brain forms a large communication with the ganglion behind the stomach.

If an injury happens to the head, the functions of volition and sensation are diminished; the stomach is disordered through the medium of the par vagum; and from the general communication between the grand sympathetic nerve, and those of the brain and spinal marrow, the functions of the heart and of the abdominal viscera become affected. The powers of the mind are also diminished; the memory is lost;

the judgment is enfeebled: thus sensation, volition, the involuntary actions, and the powers of the mind, are diminished or suspended.

Concussion and compression.—The causes of the symptoms of injury to the brain are two: 1st. Concussion. 2d. Pressure, which may be the result of extravasation of blood, of depression of bone, or of matter produced by inflammation on the brain.

I shall first describe the symptoms, dissection, and treatment of concussion.

Symptoms of concussion.—When you approach the bedside of the patient who has a concussion of the brain, you find him in what you would suppose, a sweetly tranquil sleep: his breathing is easy and not quicker or slower than natural: his pulse is beating with steadiness, and with its usual velocity, and you would be disposed to say, do not disturb him, but let him sleep on. But if you attempt to rouse him, he is with difficulty excited; if he be spoken to, he mutters, and returns an incoherent answer, and you then discover that he is comatose. Upon inquiry it is found, that he has received a severe blow upon his head, that immediately after he was senseless, and unable to stand, and that he had since vomited. At first a torpor exists in the intestinal canal, and considerable difficulty in procuring an evacuation, but afterwards the fæces are involuntarily discharged: in a few hours the bladder is distended, from the accumulation of urine, which demands the introduction of a catheter for its removal; but after some time the urine also passes involuntarily.

There is sometimes in these cases bleeding at the nose, and from the blood trickling into the throat and stomach, blood is vomited; the pupils of the eyes are generally natural; but if changed, both are a little dilated; or sometimes one only. The state of the pulse is curious. Although when the patient

is undisturbed it is natural, it scarcely ever fails to be quickened, if the patient is capable of making any effort to rise, and exerts himself for that purpose. The carotid arteries sometimes beat, under an exertion, with a force disproportioned to the other arteries of the body; but generally this symptom is not observed until after a few hours.

Mind. — The mind is variously affected, according to the degree of injury which the patient has sustained. In some cases there is a total loss of mental power; in others the patient is capable, though with difficulty, of being roused to make a rational answer, but again sinks immediately into coma. Sometimes the memory is lost, at others only partially impaired. A case is generally known to surgeons, of a man who, in St Thomas's Hospital, was found talking in a language which was not understood, until a Welsh woman entering the ward, heard this man talking Welsh, but the blow on his head had occasioned the loss of his recollection of English. I once witnessed a very similar circumstance. I attended a German sugar baker, with disease in his brain; and when I first saw him he could speak to me in English; but as his disease increased he lost his English, and I was obliged to have an interpreter, for he could answer only in his native tongue.

It frequently happens, that the patients when roused will be perfectly sensible, and answer any questions rationally; but if left undisturbed the mind appears to be occupied with some one circumstance, of which they are constantly talking. Mrs — fell through a trap door, in a house on Bennet's Hill, Doctor's Commons, on the 4th of December. When taken up she appeared as if in a sound sleep; her pulse was a little quickened, and her breathing

natural ; she was bled and purged. 5th. Complained of pain in her head, bled again. 6th. Restless, screams, and says she has universal pain. 8th. More composed and sensible, pulse quick and small; her bowels keep freely open. 9th and 10th. Sometimes sensible, at others talks incoherently, evacuating plan pursued. 12th. Much better, being more easily roused, still talking incoherently at times : fancying she has been brought to bed of five children, and distressed because she fears she has not milk enough for all of them. She frequently said, ‘ My God what a regiment to go to school ; I must not lie in again for three years.’ This was accounted for, by her sister having just lain in, and she had come to be with her during her confinement.

She ultimately recovered.

Upon inquiring of patients respecting their accident, they know nothing of it. If the injury has been occasioned by a fall from a horse, they can only remember mounting and riding to some distance, but do not recollect that the animal ran away, or had thrown them ; nor, however perfectly in other respects they may recover, have they ever any recollection of the kind of accident ; yet when they regain any power of volition, or sensation, they will act from habit. This is well illustrated by the following case. June 3d. Mr S’s horse ran away in Chiswell Street, and rushing against a dray was killed. Mr S. was thrown over the dray, and was taken up senseless. I saw him about half an hour after the accident, when he was restless and impatient : he had two wounds on the scalp, one of which penetrated to the bone. He was immediately bled ; but being seized with violent convulsions, and his pulse being slow and weak, the vein was closed. 4th. In the same state as on the preceding evening ;

at noon, his pulse being hard and quick, he was bled to twelve ounces, and afterwards became more sensible. 5th. Had passed a restless night; the pulse full and slow; he was cupped on the neck. 6th. He ordered the servant to quit the room, got out of bed, bolted the door, and had a stool, but returned to his bed without unbolting the door, which was obliged to be forced open, as they could not rouse him. At another time he lathered himself with his blistering ointment, as he wished to shave; and washed his feet with some lemonade in the chamber-pot. 7th. He was bled to eight ounces. 9th. Ordered calomel in small doses. 10th. His attendants thought he had a fit, but it was only of a minute's duration. 11th. Blisters applied to his temples; he had two fits in the night, one lasted ten minutes, during which he struggled, foamed, and was insensible. Dr Babington saw him. 12th. Complained of pain in his head; he was bled to four ounces, and purged. 13th. Pulse 65, had been before about 60. Chilly pain over his eyes, again bled in small quantity, and purged. 14th. Very restless; mind wandering; quarrelsome; bowels freely open, pulse quick, his nose bled twice. 16th. Much better, his skin moist, easily roused, more sensible, and listens to conversation. 20th. Answers questions more readily; much improved. He gradually got quite well, but did not recollect any thing about his ride previous to the accident.

It is curious to observe the change which takes place in the intellectual faculties, as alterations are produced in the structure or state of the brain; the gradual diminution of ideas which have been recently acquired, until, at length, they become wholly obliterated. Old persons are observed to be fond of relating the anecdotes of their youth, forgetting incidents of more recent occurrence; and the change

produced by injuries to the brain is somewhat similar to the effects of age; the patient loses impressions of a recent date, and is sensible of those which he has received in his earlier years.

The degree of injury sustained by the brain in different cases, however, varies greatly. Some are only stunned or deprived of sense for a moment, others recover in a few hours; some remain, in a great degree insensible for fifteen to twenty days. Some recover entirely, others have afterwards an imperfect memory. A partial loss of sense will be sometimes produced in the function of one eye, or deafness in one ear, and so of volition, as the squinting will continue which has been produced by an injury of the brain. A degree of fatuity, in some cases, ever afterwards remains; great irritability will continue in some persons, in others the least excitement will produce pain in the head. In one case I knew a remarkable irritability of the stomach remain after concussion of the brain; so that the least excitement would produce vomiting; and this symptom, as well as the usual occurrence of vomiting in these accidents, is probably produced by the direct communication between the brain and the stomach by the eighth pair of nerves.

Case.—Mr T., a medical gentleman, received a blow on the forehead, during a riot which he was endeavouring to quell: he was stunned for a few moments, but did not immediately find any further inconvenience from the injury. A few weeks afterwards he began to feel a constant nausea, followed by occasional vomiting, which, at first, occurred once, then twice in the course of the day, and at length became very frequent. Sometime after he had received the blow, he was trephined by my uncle, formerly surgeon to Guy's Hospital, but he did not derive any advantage from the operation.

The nausea and vomiting still continued, he became emaciated, was in a constant state of anxiety and distress from the nature of his complaint, and died exhausted, in consequence of the injury.

A permanent loss of memory is sometimes the effect of these accidents; frequently the patient has a difficulty in uttering the words which should express his ideas, and uses wrong terms; the judgment is enfeebled, giddiness, pain in the head, and great irritability of the nervous system, sometimes result from concussion.

Case.—Mr Blanchard was overturned in a carriage in 1816, and wounded on the forehead by the stud of the window. In twenty minutes he became sick, and was speechless, though quite sensible: he had severe spasms in all the muscles, and a creeping sensation in his whole frame. On the third day he returned home; for four days after he had delirium; this was followed by great debility, which continued for a year, so that he was scarcely able to walk; the whole head was cold and benumbed; he had frequently, from attention to business, or excitement of mind, numbness and coldness of the head, and delirium. Two years ago he had apparently recovered, and he travelled to the Lakes; on his return he had swimming in the head, sickness, and delirium; he was bled freely for the first time, and, excepting once, has ceased to be delirious since. An incision was then made on the part injured, and the bone was found to have been slightly fractured. A year and a half ago he became delirious for half a day; but when this subsided his legs became painful yet benumbed, and was succeeded by lameness which continued for a year.

His present state, August 1824.

1st. Difficulty of utterance, and in expressing the ideas he wishes to convey.

2d. Benumbed sensation in the head and legs.

3d. Great debility.

4th. Affected by weather; in a humid day has more numbness and debility.

5th. Exertion of mind augments his unpleasant feelings. Exercise increases the numbness in the head and legs. Sight is weakened. Sleeps exceedingly well.

6th. Pressure on the cicatrix benumbed the part, and made him almost speechless.

7th. A leech applied upon the part produced most excruciating pain for an hour, with spasms. He has tried a great variety of remedies, without effect.

I have known concussion arise from the general shake of the body, unaccompanied by any blow upon the cranium, pain in the head succeed, with the usual symptoms of concussion, and the patient's life be greatly endangered.

Dissection. — With respect to the state of the brain under concussion, when the injury has not been excessively severe, it seems that the symptoms are merely the effect of a disturbance of the natural course of the blood through the brain. A fit of vomiting, by forcing the blood through the brain, will sometimes almost immediately restore the functions of the mind and body. It seldom happens, that this state of the brain destroys: but when it does, nothing is found upon the examination which will account for the symptoms. It is, therefore, an alteration of function, but not a disorganization.

Laceration. — But when the concussion is very violent it is attended with lesion of the brain. We

have a number of preparations before us, showing this state of the brain, in which you will see laceration of it accompanied with slight extravasation.

The first example of this which I witnessed was in a patient of Mr Chandler's in this hospital.

Case.—John Stam was admitted into St Thomas's Hospital, Saturday, Feb. 15, 1793. By the overturning of a cart he had received a wound in the arm, and had some symptoms which led the surgeon to think him intoxicated. On visiting him a few hours afterwards he seemed to be perfectly sensible, but had lost his speech. There did not appear to be any injury of the head, on an attentive examination, yet by signs he led us to think this the injured part: his pulse was full and quick. He was bled and purged, and on the following morning his pulse was smaller; he had slept soundly, and seemed to be much disposed to sleep. On the following day he continued pretty well, taking plenty of nourishment. On the 18th, in the evening, he had a sudden change for the worse; his features altered, his mouth was drawn a good deal to the side; he had difficulty in swallowing, and his urine and his fæces passed off involuntarily. He continued thus until the morning of the 20th, when all his bad symptoms left him, excepting the loss of speech. He remained free from any other symptoms for many days (excepting hiccough); but then his appetite began to fail him, and he became emaciated. He had, about a fortnight after his admission, a return of the difficulty of deglutition, and the urine and fæces again passed off involuntarily. He had now every evening at nine o'clock a delirium come on, which rendered it necessary to strap him to his bed, as he struggled violently. On the 8th of March he died, just three weeks after his admission. The wound in his arm discharged but little the first two days, but after-

wards it wore a very bad aspect. He had enjoyed a good state of health previously.

DISSECTION.

On examining the head, the scalp and cranium were found free from injury. The dura mater also appeared healthy. On the pia mater there was some slight effusion of a transparent serum; on cutting away the hemisphere to show the centrum ovale, the brain was found lacerated. The colour of the medullary substance, as well as the cortical, was changed to red in many places, and the size of the laceration was about two inches long by an inch wide. The substance was very soft, and it appeared ragged. There was a small quantity of purulent matter found in some places. Ulceration seemed to be present, as there were a number of small holes in the brain surrounding the laceration.

Case. — Another very extensive case of laceration occurred in the person of a friend of Lord Nelson's. Mr Coppendale, 27th June 1805, fell from his horse in the Borough, and was brought to Guy's Hospital. He had a wound on the back of his head, which bled freely. He was totally insensible; the pupils were dilated; the pulse 60, and regular. He was bled from the arm to a considerable extent before he could swallow, and an enema was administered.

On the second day he was insensible, his pupils were contracted, and remained so in the dark or light. On the third day he gave signs of returning reason; swallowed freely, and could be roused to answer a question. He performed all the animal functions, and asked for the means of doing so. He knew several of his friends. His pulse still at 60. He said he was very well, and wished to rise; but frequently complained of his head. On the fourth

day favourable symptoms began to vanish; he became more sleepy, and more difficult to rouse; and when Lady Hamilton called upon him, he could not be made to open his eyes, or speak to her. From this day the torpor increased; he passed his stools and urine in bed; his eyes became nearly insensible to light, though one of his pupils was still contracted, and the other remained to the last moment of his life dilated and immovable. He slept almost constantly, though with frequent intervals of restlessness. He had no convulsive motions, excepting a slight subsultus tendinum a few hours before his death. His heat remained natural, until thirty-six hours before he died, when it was irregular and unequal; the face, by turns, red and pallid; the legs, one warm, the other cold; forty hours before his death the pulse began to flag, but quickened on the least motion: at one time it was 70, and in ten minutes after 120; a few hours before death it was constantly quick, to 150, and sometimes higher; the breathing only thirty times in the minute.

The treatment pursued was, bleeding, blisters to the neck, and synapisms to the feet.

DISSECTION.

Extravasation on the scalp, some blood on the dura mater and brain, and some from the lateral sinus of the dura mater, which had been torn. Brain torn in five different places, two in the anterior, three in the middle lobes.

Skull fractured at the basis, through the meatus auditorius; petrous portions of the temporal bones and sella tursica.

The following is also an interesting case:

Case.—A waiter at a coffee-house in the Strand, who had been previously subject to epileptic fits,

was ordered to clean the windows of the first floor of the house; and whilst in the act of doing so, and standing on the outside of the window, he was supposed to have been seized with a fit, and fell into the area beneath. On being taken up, a wound was found on his forehead, and he had lost both sensation and volition. Having resided in the Borough, he was carried to Guy's Hospital, and when admitted there, a fracture was discovered in the os frontis, but without any depression of the bone; and as he had no symptoms of compression, the operation of trephining was not performed. On the following day to that of his admission he died, without having, in any degree, recovered from the accident.

When the head was examined, the fracture was found confined to the upper part of the os frontis; and opposite to the fracture on one of the anterior lobes of the cerebrum, a considerable laceration was discovered. On the falx major was situated a large patch of earthy matter, evidently of long standing, which had probably been the cause of his epileptic fits.

If, then, it be asked, in what does concussion consist? the answer is, that if it be slight, it is merely a disturbance of the circulation in the brain; if violent, the brain is lacerated. A knowledge of this leads to a judicious treatment of the injury, as laceration of the brain is frequently followed by extravasation: and concussion in the commencement, may be compression in its result.

TREATMENT OF CONCUSSION.

The great danger which we have to guard against in the treatment of concussion, is inflammation of the brain. This principle must direct our practice; and in order to prevent inflammation, we must soon after

the accident take away a very considerable quantity of blood. By bleeding largely, we not only remove existing inflammation, but we prevent that which would otherwise occur. This practice, however, may be carried to excess. You must, in the repetition of bleeding, regulate your conduct by the symptoms; observe whether there be any hardness in your patient's pulse, and whether he complains of pain in the head, if he have still the power of complaining: watch your patient with the greatest possible anxiety; visit him at least three times a-day; and if you find any hardness of the pulse supervening, after the first copious bleeding, take away a tea-cup full of blood; but do not go on bleeding him largely, for you would by this means reduce the strength of the patient too much, and prevent the reparative process of nature. It is necessary that there should be a slight degree of inflammation, for without this the reparative process cannot proceed, or the patient ultimately recover: but it will be your duty to keep this inflammation within due bounds. I shall mention a case in which fatal consequences ensued from the error committed by the surgeon in bleeding his patient to such excess, that the slight degree of inflammation necessary for adhesion was removed, and the restorative process of nature consequently prevented.

In these Lectures, gentlemen, I feel it to be my duty to describe to you surgery as it is, and not in the glowing colours in which it is painted to you in books. I am most anxious that you should omit nothing which may contribute to increase your professional skill, and enable you to afford the greatest possible degree of relief to the sufferings of humanity; but those who blazon forth our profession as one which is attended with undeviating success, are only deceiving you. You must hear the untoward cases of your profession, as well as those of which the

issue is favourable, in order to form a correct judgment in your minds, of what surgery really is. It is for these reasons, that I shall never hesitate, '*coute qui coute*,' to detail to you, and perhaps to the public, those cases which have terminated unfavourably. I have a duty to perform, and I shall never shrink from the discharge of it. It is by detailing to you the unfavourable as well as the favourable cases, that I can alone perform that duty; for it is by such a course alone that I can point out to you the rocks which you are to avoid, as well as the haven in which you are to endeavour to anchor. The case, to which I last alluded, was one of concussion, accompanied with slight laceration of the brain, which occurred in the other Hospital. The gentleman, under whose care the patient was, thought it right to bleed him, and that he could not bleed him too largely. He accordingly bled not only from day to day, but twice a day. The consequence of this mode of treatment was, that the patient became perfectly pale, was in a state of considerable dejection, not of the mind, but of the powers of the body, and died, without any symptoms of inflammation of the brain, ten days after the injury. On examination of the head, it was found that there was a slight laceration of the brain, with some degree of extravasation of blood; but that not the slightest attempt had been made by nature to heal the wound. You are aware that the brain heals, like any other organ, by the process of adhesion; but, in this case, the quantity of blood taken from the patient was so large, that the slight inflammation necessary to the adhesive process was removed, and the powers of restoration consequently prevented. Still it is often necessary to take away blood after the first large bleeding; but it must be taken in small quantities, and you must watch the patient with the greatest possible anxiety; for the

symptoms can alone regulate your practice. Sometimes it is necessary to take away large quantities of blood, in repeated bleedings. I was called to a gentleman, of very full habits, who had fallen from his horse in riding to London. Mr Constable, of Woodford, who attended him, had already bled him, but I judged it necessary to bleed him again, largely; and I took blood in smaller quantities from him, day after day, watching the pulse with the greatest anxiety, and bleeding him so far as to reduce the hardness of the pulse, without diminishing too much the powers of his body. The whole quantity of blood taken from this gentleman, by bleeding from the arm, opening the temporal artery, and the application of leeches, as far as this could be estimated, amounted to about two hundred and eight ounces of blood. One hundred and eighty ounces were taken from the arm, the rest by leeches and from the temporal artery; yet such was the hardness of the pulse, that at the last bleeding there was some degree of inflammation of the brain remaining. This gentleman recovered.*

* I have taken the liberty of introducing the following case, as one of considerable interest; the patient having, for some time previous to the accident, been subject to symptoms of cerebral affection.

William Smith, æt 19, a stout, tall, and robust man, fell into a cellar, about twenty feet deep, and appeared to have fallen on the right side of his head, there being two small wounds of the scalp on that part: the pericranium was not detached. Tuesday, March 11, 1823, he was brought into the hospital, in a state of insensibility; his countenance flushed, both pupils contracted; but, upon disturbing him, they became very much dilated, and varied in appearance very frequently. Pulse quick, hard, full, and regular; he was excessively restless, and upon every slight exertion the pulse became very much accelerated; the breathing was slightly stertorous. From sixteen to eighteen ounces of blood were taken from the arm immediately; after which the pulse became rather softer, breathing less audible, and a slight degree of faintness was produced. At five o'clock

You are to use bleeding as a means of preventing inflammation; but you are not to resort to it as a

the same day, the pulse having risen from 90 to 116 in a minute, eighteen ounces more blood were taken, which had a more marked effect on the pulse, and produced a greater degree of faintness than the former; but he again became very restless, and at twelve o'clock the same night, lost twenty ounces of blood from the back part of the neck by cupping: the head was shaved and a spirit lotion applied over the whole surface; twenty grains of the colocynth and calomel pills were given. — Wednesday, 12th, Had passed a very restless night; remained much in the same state. Pulse quick and frequent, but not having had any evacuation from the bowels, six grains of calomel and 3ss. of rhubarb were given. At half past eleven o'clock, A. M. he was again cupped at the back part of the neck, and lost fourteen ounces of blood: a large blister was applied to the back part of the neck: he was still unable to answer any question put to him: the state of the pupil varied as before. Four o'clock, a glyster was given, containing an ounce of castor oil, but produced no evacuation. Seven o'clock, five grains of calomel and twenty grains of jalap were given, and another glyster at eleven o'clock. A short time after the latter, he had a considerable evacuation, which reduced the pulse in frequency and fulness. Thursday, 13th, had passed a restless night, but less so than the previous one; the bowels had been freely evacuated, and he was much reduced; his pulse became small and frequent, and his countenance rather pallid; he appeared conscious of what was said and done, but unable to answer any question. The blister was kept open and discharged considerably. — Friday, 14th, remained restless, and unable to answer any question: pulse quick and frequent; bowels moderately open; an ounce of castor oil was given; blood was again taken from the arm to the extent of fourteen ounces; and two grains of calomel, with a grain of conium, given at bed time. — Saturday, 15th, Much the same: had taken two pills in the morning, and was to repeat them at bed time: he appeared much more conscious of what was said, and could answer questions occasionally. — Sunday, 16th, Having passed a restless night, and his pulse being quicker and fuller than the previous day, he was again bled to the extent of eighteen ounces, and which, when coagulated, had a buffy appearance on the surface; but the crassamentum remained loose: the pills were continued as before. — Monday, 17th, Had passed a better night, and answered questions much more readily: the pills continued. — Tuesday, 18th, Opening medicine was given. — Wednesday, 19th, Had been more restless

matter of course, the moment you are called to a patient under concussion. A man falls from his horse, and the instant he is raised from the ground some surgeon thinks it necessary to use the lancet. This conduct is quite irrational; for, suppose the pulse could scarcely be felt at the wrist, and the surgeon were in such a case asked why he proceeded to bleed, what would his answer be? The probability is, that he could make no reply; or he would perhaps say, that he bled because the accident had determined a great quantity of blood to the brain. It is not with this view that we bleed in concussion, but in order to prevent inflammation. I have seen patients, who would have died if a large quantity of blood had been taken away at the time of the accident. Thus in the case already described, when I first saw it, the pulse was scarcely perceptible. I took a little blood from the arm, and the patient was immediately seized with convulsions, like an epileptic fit, which I thought would have proved fatal. I closed the arm, and I would not upon any account have taken more blood from him at that moment.

Case.—Some time ago I saw a man, at the other Hospital, who had received a blow on the head. He was pale and dejected, and his pulse could scarcely be felt. I said to the dresser, you must not

than the former night: pulse quick, hard, and full: countenance flushed: he was bled from the arm to fourteen ounces: pills continued, &c. — Thursday, 20th, much the same; eight ounces more blood were taken: pills continued, &c: — Friday, 21st, less restless than before: bowels rather confined: infusion of roses 3 jss. and Epsom salts 3 j were given, three times a day. — Saturday, 22d, complained of slight pain in the head: pulse quick; bowels open: eight ounces of blood were taken; after this he gradually recovered, and was discharged from the Hospital on Wednesday, April 23d, 1823.

The quantity of blood taken amounted to one hundred and thirty ounces, in the space of eleven days. — T.

bleed this man at present; there is rather too little action than too much. Wait till the pulse rises, and then bleed him. In the evening reaction took place; the pulse rose, and the dresser then very properly bled him. Inflammation was by this means prevented, and the man did well. The principle on which you should act, gentlemen, is never to do any thing in your profession without a good reason, which, whatever may be the result of the case, will leave your conscience clear. You are not to bleed because a patient has received a blow upon the head, but you are to bleed to prevent inflammation; and I hope to be understood, that it is not to bleeding that I object, but to immediate bleeding in those cases in which there is a remarkable depression of the nervous power.

Emetics. — Emetics have been proposed as remedies for concussion, and I certainly have seen vomiting useful; I consider the efforts of nature to relieve herself, after injuries, as generally salutary; and thus it is that the vomiting, which is excited in cases of concussion, acts beneficially, by relieving the stomach of its contents, and by propelling the blood to the brain, and thus restoring the powers of life. But the vomiting excited by nature often restores the patient to his senses only for a short time; he is sometimes relieved, but without continuing so long; he looks about him and lapses into his former state of aberration of mind, from which he had received merely a temporary relief. When emetics are exhibited as a remedy in concussion, there is only one thing that I fear from their use; when there is any extravasation of blood in the brain, or any tendency to apoplexy, then they should be used with caution; and it is on that account that I wait three or four hours after the accident before I order them. It is in le-

nient cases of concussion that they are useful; in lacerations of the brain they are dangerous.

Purgatives. — With respect to the exhibition of cathartics, the bowels should be kept open by calomel purges, followed by the infusion of senna and sulphate of magnesia. The calomel should be given about two hours after the accident; and it will be useful to give to the patient, at the same time, a quantity of acidulated drinks; as by this means a disposition to purging is kept up, counter irritation is produced, and the blood is drawn from the brain to the intestinal canal. Submuriate of mercury is proper as a medicine, and lemonade as a drink.

Diaphoretics. — Perspiration is very desirable, and for this purpose antimonials are employed. The pulv. ipec. comp. (Dover's powder) is not generally used to produce moisture of the skin, on account of the opium it contains, as it confounds the judgment, and prevents your seeing what are the effects of the opium, and what those of the injury; for opium produces the same effects upon the brain as some of the injuries to which it is liable.

Counter irritation. — Counter irritation is of use, but not until other means have been resorted to; the object in applying blisters is, by exciting inflammation of the scalp, to subdue the inflammation of the brain when other means have failed. I have known a patient with pain in the head, sickness, loss of strength, and throbbing of the carotids, who had been relieved by free bloodletting for about two hours only, much benefited by the application of a blister.

Trephining for after symptoms. — For the symptoms remaining after concussion, the trephine used to be employed; but it now becomes a question, whether it ever ought to be resorted to in these cases? What will trephining do? Probably great harm,

by disturbing the brain; and, if not, no good can possibly result from it. Now for the proofs: first, that it does no good. Gentlemen, I never lecture to you but from the recollection of some case that has occurred to me, from which I form my opinion. In a former part of this Lecture, I mentioned to you a case of great irritability of the stomach, produced by concussion, the effect of a blow on the forehead, which happened at Yarmouth, in Norfolk. Mr W. Cooper, formerly surgeon of Guy's Hospital, visited this gentleman, and prevailed upon him to suffer the trephine to be applied upon the part of the forehead on which the blow was received; and, when the bone had been removed, the dura mater was sound, and no relief whatever arose from the operation; a direct proof that it is useless. Dr Farre informed me, that he knew a person who was subject to epileptic fits after concussion of the brain. The operation of trephining was performed, and he died soon afterwards.

Forty years ago, trephining used to be the plan generally adopted with the patients admitted into the London Hospitals; many were submitted to the operation; inflammation of the membranes of the brain supervened, and nearly all died; recovery being very rare. But do our patients now die from the effects of concussion? No; by depletion we rarely lose a patient.

After the expiration of my apprenticeship at these Hospitals, I went over to Paris, to see the practice of Desault, at the Hotel de Dieu; and there I found that scarcely ever under any circumstances did he trephine; and he was more successful than the English surgeons. Trephining in concussion is now completely abandoned.

In the treatment of concussion, when the patient has any mental power remaining, let all excitement

of the brain be avoided. I was very much struck, about twelve months ago, with the following circumstance: a young gentleman was brought to me from the north of England, who had lost a portion of the skull, just above the eyebrow; and I was asked (for it was for this purpose that I was consulted) what protection should be given to the brain. On examining the head, I distinctly perceived the pulsation of the brain was regular and slow; but at this time he was agitated by some opposition to his wishes, and directly the blood was sent with increased force to the brain, the pulsation became frequent and violent; if, therefore, you omit to keep the mind free from agitation, your other means will be unavailing. All common external stimuli should be abstracted, as light and noise. A dark and quiet room must be recommended.

Treatment of children. — Lastly, in the treatment of children: as you cannot always bleed them from the arm, you must give the *submurias hydrargyri* (calomel), with acescent drinks, so as to purge them; leeches must be applied to the temples: and you may open the jugular vein.

For the symptoms which remain after concussion, as pain in the head, giddiness, diminution of sight, and deafness, it is right to wash the head with spirits of wine and water; or to use the shower bath. These are the best means for giving power to the nervous system, and bringing the action of the brain into a healthy state. Sometimes I advise *ungt. lyttæ* to be rubbed upon the head, and *pil. hydrarg.* and *ext. colocynth comp.* to be given. Electricity, in nervous debility of an organ, is sometimes useful. In long-continued pain of the head, I sometimes make an incision in the scalp, and open an issue, for the purpose of supporting external irritation; and have seen advantage arise from producing a slight exfoliation.

LECTURE XI.

COMPRESSION OF THE BRAIN, THE CAUSES WHICH GIVE RISE TO IT, ITS SYMPTOMS AND THE TREATMENT WHICH THOSE SYMPTOMS REQUIRE.

Symptoms. — WHEN a patient has a loss of sensation and of voluntary motion, an aploplectic stertor, slow labouring pulse, and one or both pupils dilated, it will be generally found that the brain is compressed.

Causes. — The causes which produce compression are three: 1st, Extravasation of blood; 2d, Fracture with depression; and, 3d, A formation of matter within the skull. These are the three causes which give rise to compression.

From extravasation. — I shall first describe compression when produced by extravasation. When the brain is compressed by extravasated blood, the symptoms do not occur immediately after the accident; the person at the time of the injury is stunned, recovers himself, and a short time after falls into a comatose state, and then the apoplectic stertor begins. I will relate to you some cases to illustrate this. A child was playing on a chair, from which it fell on a stone floor, and received a severe blow on the head: the child cried violently, was sick, but was during the evening sensible. It was put to bed a little before its usual time; in the night, the servant was disturbed by its restlessness, and on the following morning it was found dead.

Case. — Mr R. W., æt 19, was driving in a gig with his brother, when turning a corner to the right, the

horse ran away, and in endeavouring to stop him the rein broke: he then vaulted over the hind part of the gig, and fell upon the back of his head, neck, and shoulders; he got up, but complained of pain in his hip and back; he drank a glass of water, and was then taken to the stables in the gig, where he remained half an hour, complaining of sickness, after which he walked about two hundred yards to the house, and got into bed, still feeling very sick: torpor gradually came on, and his extremities became cold. The accident happened at five o'clock on the 24th of April, and he died about two o'clock on the following morning.

Case. — Thomas Fennel, æt 70, having fallen from a height of twenty-two feet, was brought into St Thomas's Hospital, on the 1st of October 1816. A lacerated wound was found in the scalp, over the right parietal bone, but no fracture. His pulse was slow and labouring: his pupils dilated: his breathing was natural: he had not vomited. About ℥j. of blood was taken from his arm, when the pulse rose, and became soft. In four hours after, being very restless, and his pulse having risen, another ℥j. of blood was taken away; his pulse became softer; he had intervals of sensibility, but was extremely restless. In the evening he became again perfectly sensible, and muttered a great deal; his pulse was feeble and quick; shortly afterwards his breathing became stertorous, his extremities cold, and he gradually sunk.

DISSECTION.

There was no fracture of the skull: but laceration of the left middle lobe of the brain, with extravasation of blood into the left lateral ventricle, and into the substance of the brain near the lacerated part.

When extravasation is combined with concussion, the symptoms of concussion, such as I described to you on a former evening, first appear, and the apoplectic stertor and other symptoms of compression succeed.

Case. — A gentleman was at a party with some friends. He drank freely of wine, and became inebriated. His home was at some distance from where he spent the evening; and his friends, seeing that he would be exposed to great risk, wished him to stay in London; but he could not be prevailed upon to do so. He mounted his horse, and on the way was thrown. He was carried home in a comatose state: symptoms of concussion showed themselves in a loss of voluntary motion and sensation; at first no signs appeared of extravasation of blood: at two o'clock on the following morning the apoplectic stertor began, and at eleven he died.

Case. — A boy was admitted into Guy's Hospital, Oct. 3d, 1816, with an injury to his head; he had been thrown from a horse. He was taken up insensible, and shortly after he vomited: his pulse being very feeble, he was not bled. 4th, He was comatose; the pupils were dilated, but contracted on exposure to light: he could not be roused: his breathing natural: the scalp was sound, but much tumefied in two or three places; an incision was made into the largest of these swellings, which was situated at the upper part of the occipital bone; when a fracture was discovered extending towards the basis, but there was not any depression. He was bled from the arm to sixteen ounces. In the evening, his bowels were freely opened by the action of some calomel he had taken: he was very restless, and resisted when an attempt was made to open his eyes: at night he continued extremely restless, and his stools passed involuntarily. 5th. Still rather restless; pu-

pils dilated : took occasionally barley water. In the evening the breathing became stertorous, and he gradually sunk.

DISSECTION.

Much blood was effused over the left hemisphere of the brain under the dura mater, more particularly on the middle lobe. The fracture only extended through the occipital bone; it commenced at the right superior part, and passed obliquely downwards through the crucial ridge to the left and inferior part of the bone.

In this case then the symptoms of concussion first came on, and those of compression succeeded.

The extravasated blood producing compression of the brain, is met with in three different situations :— first, between the dura mater and pia mater; second, between the pia mater and brain; and, lastly, within the substance of the brain itself. In the specimen on the table before me, three ounces, the largest quantity I have seen, was effused under the dura mater. In this case also there was a large quantity extravasated, opposite to the anterior and inferior angle of the parietal bone; and the dura mater itself was torn. Mr Abernethy first pointed out that the largest extravasations were at that part of the skull in which the artery of the dura mater passes through the parietal bone. Secondly, between the pia mater and brain: this is of more common occurrence; and in this case a large portion of the brain will often be found covered with blood; not that the quantity of blood extravasated is considerable, but a little is diffused over a large space. This portion of brain before me was taken from a man who fell from the yard-arm of a ship, and who was carried to Guy's

Hospital: he died four hours after his admission; and, on examination after death, many of the vessels which pass from the pia mater to the brain were found torn through. Thirdly, within the substance of the brain itself: this specimen was taken from a patient of Mr George Johnson's, of America Square, who fell from his horse, and was found with symptoms of concussion of his brain, for which Mr J. attended him, and by the judicious means he employed redeemed the patient from all his urgent symptoms; but some weeks after, having neglected the rules of conduct which had been recommended for his guidance, he was seized with symptoms of inflammation of the brain, of which he died.

Mr Johnson and myself examined the head together; and we found, in one of the anterior lobes of the cerebrum, a coagulum, deeply seated, and a little altered in colour from the usual appearance of recently extravasated blood, having a brownish tinge: the brain adhered firmly to the circumference of the coagulum, and exhibited other marks of inflammation.

The diseased part is preserved in the collection at St Thomas's Hospital.

These are the three situations in which extravasated blood is principally found. I do not observe any variety of symptoms produced by the different situation of the blood; the symptoms of compression arise from the pressure of the blood; and the quantity of blood effused will depend on the size of the vessel of the dura mater that is divided; whatever is the situation of the blood, the symptoms of compression vary but little; if there should, however, be any blood resting on the origin of a nerve, there will be partial paralysis of those parts which that nerve supplies.

Treatment. — In the treatment of these cases, there

is little to be done but to deplete freely, for the purpose of preventing irritation and inflammation; the bowels are to be opened, and the patient kept very quiet. If there be a bruise, indicating the spot at which the injury has been sustained, you may trephine, after every other means have been tried ineffectually. If a fracture exists, and the symptoms do not yield to depletion you will trephine to seek the extravasation. If blood be not found between the dura mater and skull, do not puncture the dura mater to seek for it; it is of no use, as the blood is coagulated and will not escape, and it is seated under the pia mater, or in the brain itself.

OF FRACTURES OF THE SKULL.

These fractures are not usually in themselves dangerous, but they become so by being united with concussion or extravasation; when, therefore, you are called to a case of wound in the scalp accompanied with fracture, you inquire as to the nature of the symptoms, to learn if they be those of concussion or of extravasation, and you regulate your treatment in the way in which I have already described. There is also a remote danger in fractures of the skull, from inflammation.

Fractures at the basis of the skull are extremely dangerous, because they are generally united with extravasation; or if not, inflammation of the brain, from the violence of the injury, very often supervenes. The mode in which these fractures are produced is by falling from a great height on the summit of the head. The whole weight of the body is received on the foramen magnum, and cuneiform process of the os occipitis; great injury is in this way done; for in many cases a transverse fracture through the foramen magnum, cuneiform pro-

cess, and part of the temporal bone, is the consequence; a discharge of blood into each meatus auditorius accompanies it; and, where there is no other mischief, deafness sometimes remains for life.

The following cases of fracture, at the basis of the skull, will best show the manner in which these injuries occur, as well as the fatal effects produced by them.

Case. — On Thursday, the 17th August, Charles Ellis, a private in the Coldstream regiment, fell from a ladder, about eight feet high, into a cellar, and pitched upon the right side of his head and shoulder: immediately after the accident he was brought to Guy's Hospital. On his arrival he was perfectly sensible, and answered every question which was put to him: the men who conveyed him to the Hospital said that he was insensible for a short time after the accident. On examining his head, a small tumour was found on the lower part of the right parietal bone, and a slight discharge of blood from the right ear. As he was quite sensible, and did not complain much of pain in his head, he was bled to the extent of ʒxij. and a purgative was given. He vomited a great part of the night. On the following morning, his pulse being quick and strong, ʒviij. of blood were taken from the temporal artery, a draught of castor oil was given at the same time, but was very soon rejected: an enema was then administered, which was followed by a small quantity of fæces. On Saturday morning he was insensible; his pulse upwards of ninety, and strong: sickness and vomiting continued: his thirst great: the skin hot and dry: he was bled from the arm to the extent of ʒxij, and an enema was administered. In the evening I saw him, and took away ℥j. of blood from the arm, and the enema was repeated. Sunday morning, the patient still remained insensi-

ble; his pulse ninety, and strong: when the bleeding was repeated to the same extent as on the preceding evening, and an enema administered, which was followed by a larger quantity of fæces than any of the preceding. I saw the patient in the afternoon, and found the symptoms somewhat abated: the enema was repeated the same evening. Monday morning, the pulse not so quick and strong as on the preceding day: the skin was covered with a gentle perspiration; but the patient still insensible: the pupils dilated. There was no sickness or vomiting now, except when food or medicine were given, which were immediately rejected: the enema was repeated. In the evening the pulse was quicker, and the symptoms not so favourable as in the morning: ordered venesection to 3 xij. and another enema. Tuesday morning; pulse quick and small: pupils dilated: stools passed from him involuntarily: the tumour on his head was opened, but no fracture or depression was discovered. The following morning he died.

APPEARANCES ON EXAMINING THE HEAD AFTER DEATH.

A fracture was found on that side of the head on which the injury was received, extending through the temporal bone, and nearly through the sphenoid bone: there was considerable extravasation on the same side of the head between the dura mater and skull. On the opposite side the extravasation was much greater, between the dura mater and brain; covering nearly the whole surface of the brain on the left side. There was not any thing peculiar in either of the ventricles; but there was a small laceration of the cerebrum on the left side of the head.

Case.—June, 1814, Joseph Constable was brought into Guy's Hospital, having fallen about twenty feet,

on the railing of a house. When admitted, he complained of great pain in his head and shoulder. There was a wound over the right mastoid process, and another on the shoulder, from which he had lost a considerable quantity of blood. In the same day he became comatose; purgative medicines and injections were administered, by the action of which he appeared a little relieved. On the following day he was delirious, and his pulse full and hard: sixteen ounces of blood were taken from the temporal artery, and purgatives again given. The next day he was quite comatose and had the left side paralyzed; in this state he remained until the following morning, when he died.

DISSECTION.

The dura mater was detached from the transverse ridge of the occipital bone, and from the petrous portion of the temporal bone. There was an extensive comminuted fracture of the petrous portion, with some slight extravasation between the dura mater and bone.

Case.—March, 1816, James Devall, æt 48, a sailor, fell from the main deck of a vessel into the hold, a height of about eighteen feet. When taken up he was insensible, and a large wound was discovered on the upper and interior part of the scalp, at the left side. He was brought to St Thomas's Hospital within half an hour after the accident, with the following symptoms: total loss of sense and voluntary motion; slow stertorous respiration; permanent dilatation of the pupils; hæmorrhage from the left ear, and a frothy discharge from the nostrils; pulse intermittent: twelve ounces of blood were taken from his arm, without altering the symptoms,

and he died about two hours and a half after his admission.

DISSECTION.

Under the dura mater, over the right anterior lobe of the cerebrum, between three and four ounces of dark grumous blood was found. On removing the brain a very extensive fracture was discovered, beginning above the right mastoid process, and extending forwards to the anterior part of the squamous portion of the temporal bone, inwards through the petrous portion, and backwards through the foramen magnum. Another fracture extended across the anterior part of the basis of the skull.

A fracture within the orbit sometimes occurs, from which a specimen, now in the Collection at St Thomas's, was taken; when destruction of life was the consequence of the injury received. I will give the history of the case.

Case. — Thursday, June 27th, 1793, A girl, about 12 years of age, whilst walking with a large pair of scissors in her hand, fell, and the point of them entered between the eyelid and the fore part of the globe of the eye: on the scissors being drawn out, some blood followed: the eyelid fell, and she was unable to raise it; she did not, however, complain much of pain in the orbit, and had no pain in her head. Friday, Mr Wathen was consulted, who, upon examining the part very carefully, found the eye uninjured, and could discover no wound of the conjunctiva or eyelid. The girl walked to Mr W.'s and returned on foot, without being much fatigued. Saturday: She walked about the house now and then, but was soon tired, and then laid down. Sunday: Free from pain, except a little in the eye, but could not see with the other eye. She still walked

about her room with assistance. Monday: Her mother took her in a coach to Mr Wathen's; she expressed pleasure from the ride, though unable to see, and in other respects her spirits were good. As soon as she returned, she complained of fatigue, and went immediately to bed. At seven in the evening she was seized with convulsions in her limbs, and now and then her features were distorted. At twelve o'clock that night the convulsions left her, and her senses returned, which had been lost during the fit. She now for the first time complained of pain in her head; which, she said, was very violent, and attended with a sensation of great weight. At nine o'clock on Tuesday morning, the convulsions returned, and continued until her death, which happened on Wednesday morning.

DISSECTION.

Thursday, July 4. Mr Coleman and myself examined the body. On opening the cranium, a fracture was found on the orbital process of the os frontis, in which there was a hole, large enough to admit the point of the finger. In the dura mater, opposite this, there was a corresponding opening, with a portion of bone in it; between the membrane and bone, some extravasated blood was collected. In the pia mater and brain there were also openings: upon the former there were some purulent appearances, in the latter there was an incipient suppuration, with inflammation extending into the ventricle.

It now and then happens, that a blow, received upon the summit of the head, will produce a circular fracture of the entire cranium; commencing at the top of the head, passing down on each side through the temporal bone, and meeting at the basis.

Mr Chandler, late surgeon of this Hospital, admitted a case of this description, which happened by the fall of a shutter on the summit of the head; there did not appear to be any extravasation or concussion; great irritation and inflammation succeeded, which destroyed the patient; and after death it was discovered that there existed a complete circular fracture of the skull, and that the anterior portion could be freely separated from the posterior, from the vertex through the sphenoid bone. The skull is in the collection.

A curious fracture of the skull occasionally happens over the frontal sinuses. When the fracture is simple, if the nose be blown, the air escapes through the opening in the bone into the cellular membrane under the skin, and renders the forehead emphysematous. If, on the other hand, the fracture be compound, upon blowing the nose, the air rushes through the wound; so that in either case the nature of the accident may be easily ascertained.

Large portions of bone are sometimes detached from the skull, instead of being depressed; this was the case with a nobleman, now living, who met with a very severe blow upon his head, from which he has perfectly recovered.

Fractures of the skull, if unaccompanied with concussion or compression, become united, as fractures of the bones in any part of the body, although more slowly. Here is a specimen, where a circular, or rather oblong, piece of bone was, as you may perceive, completely separated from this part of the os parietale, by the cut of a sabre, and yet it became reunited. Fractures of the cranium, therefore, easily unite. Where, however, large holes are made through the skull, the apertures do not in general become filled with ossific matter, but by a tendinous structure, formed from the dura mater and united

to the pericranium. The holes made by trephining are thus filled, and not by bone. Also, when in fractures of the skull, where the bones are separated to any distance, the interspace will not become filled by bony matter, but remain open, as you see in this skull, which had been fractured and the broken part widely separated.

The treatment of fractures of the skull is as follows: when there is fracture, unaccompanied with symptoms of injured brain, you will not trephine; but you must, by the application of adhesive plaster, endeavour to heal the wound in the scalp as quickly as possible. Let your constitutional treatment be that of depletion, by means of blood-letting and purgatives. This plan removes symptoms of concussion, and even extravasation, which accompany these fractures; and often a few hours will show you that the application of the trephine, which you at first might have thought indispensable, is rendered unnecessary. It is wrong, therefore, to decide hastily in these accidents; for irreparable mischief might arise from your making an incision, and converting a fracture, which was simple, into one that is compound. Wait then for a time before you operate in such cases, for the purpose of seeing what effects may be produced by bleeding and purgatives. It not unfrequently happens, in these Hospitals, upon persons being brought in who have received injuries of the head, that the dresser in attendance will bleed them immediately after their admission, and send for the surgeon; before whose arrival the good effects of the loss of blood are apparent, and the symptoms of concussion, and even of extravasation, have lessened, so as to lead to a different view of the case. This shows how necessary it is that you should not be precipitate. If you act prudently, therefore, in these accidents, you will try bleeding

and purgatives before you operate ; and the depletion will prove of the greatest possible advantage in preventing inflammation ; from which arises a principal danger.

Fracture with depression. — The next subject to which I shall direct your attention is, fracture with depression. I will tell you what you ought to do in such cases, and leave you to act for yourselves.

Experiment. — In order to ascertain the symptoms arising from depression, I tried the following experiment : I applied the trephine to the cranium of a large dog, and took out a portion of bone. I then with the handle of a knife separated the dura mater from the bone ; for I found that I could make no impression on the brain until I had done so, and then pressed upon it with my finger. At first the animal did not seem to feel it ; but upon pressing more deeply, it produced pain and irritation, and he endeavoured to avoid it. Upon still increasing the pressure, he became comatose, and sunk on the table. I kept him in this state for five or six minutes : when, upon removing my finger, he got up, turned round two or three times from giddiness, and walked away apparently little worse for the operation. A gentleman who felt the animal's pulse during the continuance of the experiment, stated, that it became slower as the pressure was increased. In depression of the skull in man the pulse is the same — slow and labouring, and the breathing is often stertorous.

Apparent depression. — After blows have been received upon the head, it often happens that upon examining the scalp, there appears to be depression of bone to a great extent, when, in reality, there is none. Let me put you on your guard here in this respect. A person receives a blow on the scalp : the parts immediately surrounding the spot where

the blow was received swell from the extravasation of blood; but at the part on which the blow directly fell, the cellular membrane, having been condensed by the injury, will not receive the extravasated blood; thus the surrounding parts are considerably higher than the middle; and the character of the contusion is certainly calculated to deceive those who are unacquainted with the nature of these accidents. I have several times seen these appearances; but the first case which I recollect of it in my own practice was that of a child brought into Guy's who had received a severe blow on the head from a brickbat. All present were prepared for the operation, fully expecting that I should apply the trephine; for they felt convinced that there was considerable depression of bone; and when I stated that I should not operate, they exclaimed, 'Good God! I wonder what can be his reason.' This child, after having been freely bled and purged, in two or three days recovered, and the appearance of depression vanished.

I have often been sent for by my dressers to these cases, and have been requested to bring my instruments with me; but upon examination have found that there was no depression of bone, and that the uneven appearance of the scalp was produced by the cause before mentioned.

It also very often happens in fracture of the cranium, that considerable depression of bone will happen from the external table of the skull being driven into the diploe, without producing the slightest injury to the internal table: do not, therefore, be precipitate in your diagnosis, nor hastily determine upon performing an operation which you might afterwards have reason to repent; these fractures, however, can only occur in those of a middle age; for in the very young and in very old age, the skull is thin and

without diploe. I believe in the course of my practice that I have frequently met with this accident; and we have many preparations in the Museum which clearly demonstrate their true character; but the three now before me are, I think, quite sufficient to satisfy your minds as to the existence of this state of the bone: here you see the external table has been driven in, and yet no vestige of fracture in the internal: here is another specimen, with greater depression; and the third still more than either, yet the internal plate is sound. I am not acquainted with the histories of these specimens; but it is evident that the persons recovered by the reunion that has occurred between the parts which were broken.

Suppose you are called to a patient who has had a severe blow on the head, and on examining the skull you find a portion of bone considerably depressed. You may still find this man capable of giving a history of the accident, and that his mind is not at all affected. On the other hand, you may be called to a person who has a fracture of the skull with depression, and who has lost the powers of his mind. If the fracture be simple, and there is no wound in the scalp, and no symptom of injury to the brain, it would be wrong to make an incision into the part, and perform the operation of trephining; for by making such an incision, you add greatly to the danger of the patient, as you may make what was before a simple, a compound fracture, and consequently greatly increase the danger of inflammation, which rarely follows fracture with depression, where the fracture is simple; but is a very frequent consequence of a compound fracture, which is produced by making an incision in the scalp. Never make an incision, therefore, when you can avoid it, or merely because there is a fracture with depression, if there be no symptoms of injury to the brain. Even if

there be symptoms of injury to the brain, and the fracture be simple, do not immediately trepan. Take away blood, and purge your patient freely, and see how far the symptoms may be the result of concussion of the brain, and not of depression. If the symptoms do not yield to depletion, then, and not till then, perform the operation of trephining. I was called to a lady who had fallen against a projection in a wall, in walking across her parlour. The os frontis was driven in, but there were no symptoms of compression of the brain. I bled her, and guarded cautiously against inflammation, but there was no necessity for elevating the portion of the bone. This lady never had any symptoms of injury to the brain, and she recovered by depletion alone.

The old practice used to be, the moment an injury to the brain was suspected, and the least depression of the bone appeared, to make an incision into the scalp. This is putting the patient to considerable hazard; for the simple fracture would, by the incision, be rendered compound. In simple fracture, then, when it is attended with symptoms of injury to the brain, deplete before you trephine; and when it is unattended with such symptoms, though there may be depression, deplete merely, and do not divide the scalp, unless the symptoms have not yielded to depletion. If the fracture be compound, the treatment must be very different; because a compound fracture is followed very generally by inflammation of the brain; and it will be of little use to trephine, when inflammation is once produced. It might be thought that it would be time enough to perform this operation when inflammation had appeared; but this is not the case; for if the inflammation comes on, the patient will generally die whether you trephine or not; and you will not arrest its fatal progress by trephining, but the operation will add to

the danger of increasing the inflammation. When inflammation of the dura mater and membranes of the brain has been excited by the depression of the bone, you scarcely retard the progress to death by performing the operation. These principles may be illustrated by many cases. In this Hospital I saw two instances: one in a patient of Mr Cline, and another in a patient of Mr Birch. Mr Cline's patient was a man who had compound fracture from a blow on the head. A portion of bone had been depressed, and Mr Cline advised him to submit to the operation of trephining. The man said, 'You may do what you like; I am no judge, but you are; so do what you please with me.' Accordingly he walked into the operating theatre to be trephined; the portion of bone was removed; he walked back again to bed, and never had a bad symptom.* A

* *Case.* — February 1823, John Mahoney, æt 30, an Irish labourer, was brought into St Thomas's Hospital, having been struck by the end of a bar of iron on his head: the blow stunned him for a few minutes. On examination, I found a compound fracture of the right parietal bone, a little above its centre, with depression of the fractured portion, in extent about the size of a crown piece, the greater part of which was below the inner table of the sound bone. The patient was perfectly sensible, and only complained of slight pain at the seat of the injury. He walked into the operating theatre, where I removed the whole of the depressed part of the bone, which was much comminuted. The dura mater was sound, and the hæmorrhage very trifling. After the operation he was freely purged, was ordered low, light diet, and kept very quiet, and merely cold water applied on linen to the wound. He rapidly recovered, without any bad symptom, and was discharged at the end of ten weeks, with the wound perfectly closed; but the pulsation of the brain could be distinctly felt, as soft matter occupied the place of the bone which I had removed. During the progress of the cure he was only bled three times.

He wears a metal plate over the part at which the bone is deficient, but this is gradually becoming firmer, and the pulsation less distinct.

Case. — Timothy Desman, æt 22, an Irish labourer, was admit-

short time after, a patient under Mr Birch, with fracture and depression, was told that he was in a similar danger, and advised to undergo the same operation. He was, however, self-willed, and obstinately refused to submit to the operation. Several days after the accident he was seized with pain in the head, and symptoms of inflammation in the brain; and when he became insensible, the operation of trephining was performed; but it did not arrest the symptoms, and he died of the inflammation. In Guy's Hospital two boys were admitted under very similar circumstances. The os frontis had, in one case, been broken by a kick from a horse, and in the other by a fall on the forehead. In one case the portion of bone was raised, and the boy did well: but the mother of the other boy interfered to prevent the operation of trephining; and though it was performed after symptoms of inflammation had appeared, he died. It is true, it happens, that fracture with depression is sometimes not followed by inflammation, even when the fracture is compound; but we cannot be certain of this; and if it ensue we cannot save the patient by trephining at a late period. The rule, therefore, which I always follow,

ted into St Thomas's Hospital, August 31, 1824. He had been struck with a hammer by accident on the superior part of the frontal bone to the left of the median line. The blow had produced a compound fracture, with depression, in extent about the size of a half-crown. He was perfectly sensible, and said he only felt a soreness at the injured part. I removed the whole of the fractured bone, which was comminuted; one small portion had penetrated the dura mater. He has since been treated exactly as the former patient was, and has not had a bad symptom since. (Sept. 20.) He has been bled twice. — T.

The appendix contains the following note: —

Since the case of Desman has been printed, symptoms of inflammation of the brain came on, in consequence of which he died. On examination of the head, a large abscess was found in the right hemisphere of the cerebrum. — T.

is this: When I am called to a compound fracture, with depression, which is exposed to view, whether symptoms of injured brain exist or not, I generally use an elevator, and very rarely the trephine. I put this instrument under the bone, raise it, and if it has been comminuted, remove the small portions of bone. The elevation of the bone is not followed by any mischief; but if you do not raise it, and inflammation follows, it will be too late to attempt to save the life of the patient.

It sometimes happens, in fracture of the skull, attended with depression, that a small spicula of bone will project into the brain, so as to produce and support epileptic symptoms. A negro had received a blow on his head with a hammer. He was taken into St Thomas's Hospital, having epileptic fits, and he had the appearance of a very slight depression on his head. Mr Birch, whose patient he was, trephined him; and as he was raising the bone, which was effected with great difficulty, the man had a violent epileptic fit. The bone seemed attached to the dura mater, and upon looking upon the inner table of the portion which had been removed, a small thorn of bone projected from it, which pierced the dura mater, and which had been produced by the inflammation following the accident, which happened four years before the operation. The dura mater was thickened around the little process of bone. The man recovered, and had only one fit afterwards.

Mischief of depression, not immediate. — The mischief of depression is not, however, always immediate; the patient sometimes recovers from the first symptoms, but is thrown, by any hurried circulation, at a subsequent period, into a new train of effects, which still require surgical assistance; and it is upon that account, if there were a wound, and I felt much

depression, that I would immediately elevate the bone; but if no wound, I would wait the production of symptoms.

In illustration, I shall mention some very interesting cases to which I wish particularly to call your attention.

Case. — Sir David Dundas was called to attend a person who, by a fall from a ladder (six weeks previous to Sir David's seeing him), had a fracture, with considerable depression of the skull. The patient had become insane, so that it was necessary to confine him by means of a strait waistcoat, and he had hemiplegia on the opposite side of the body to the seat of injury. So much time had elapsed from the accident, that the depressed portion of bone had become reunited to the cranium. Sir David immediately trephined him, taking away the depressed portion of bone. On the day following, his insanity was so far diminished, that the strait waistcoat was removed, as he did not require any further restraint. In a fortnight the hemiplegia disappeared, and all his unpleasant symptoms subsided.

Case. — Mr T. æt 31, a private in the Newbury Volunteer Cavalry, had been dining at Newbury with the troop, to celebrate the coronation of His present Majesty. When returning home at a late hour with some others of the troop, they were attacked by a number of the Queen's partizans, and during the affray which succeeded, Mr T. received a violent blow from a brickbat on the superior part of the frontal bone, which caused a depression of a portion of the bone, and considerable hæmorrhage. Mr Hemsted, surgeon, at Newbury, was sent for to attend him, and directed that he should be freely bled and purged; which relieved him so much, that at the end of four days he returned home apparently well. Mr Hemsted, however, told him he would

be very fortunate if he felt no further inconvenience from the accident, and advised him to keep particularly quiet and sober.

On the 20th of January 1822, exactly six months from the receipt of the injury, he had an epileptic fit; Mr H. was called to visit him, and recommended the same plan of treatment. The fits, however, returned once or twice every fortnight; and oftener, if he exerted himself, or was guilty of any excess. Mr H. told him, that he could not be cured without having the depressed portion of bone removed; to which he was averse, and came to town to consult me, when I confirmed the opinion of Mr H. The patient still refused to undergo any operation at that period. The fits increased in frequency; and on the 30th of July 1822, having had two, he became much alarmed, and sent for Mr Hemsted to remove the portion of depressed bone, which Mr H. did with a trephine. He speedily recovered from the operation, and has not since had any return of the epileptic fits.

Another circumstance I shall mention; and whether we regard it in a physiological or surgical point of view, it is perhaps one of the most extraordinary which ever occurred; and as connected with surgery and physiology, I am surprised that it has not made a greater impression on the public mind than it appears to have done.

Case.—A man of the name of Jones was admitted under Mr Cline, on the 9th of May 1800, into St Thomas's Hospital, from Deptford, where he had been seen by Mr Nunn Davie, apprentice to Mr Chandler, who advised that he should be sent to the hospital. When he was brought to the hospital, and placed under the care of Mr Cline, he was, in a great degree, destitute of sensation, and of voluntary motion; his pulse was regular; his fingers were

in constant flexion and extension, nearly corresponding in frequency to his pulse. He had a depression near the superior edge of the left parietal bone. When hungry he was wont to grind his teeth; when thirsty to suck his lips; when he had occasion, or want to evacuate his fæces and urine, he moved about in his bed; but he could sit in the chair, when he voided them. Mr Cline trephined him, removing the depressed portion of bone, and he made a noise of complaint during the operation. The motion of his hands ceased during the operation, and the pupils of his eyes were directed forwards. At four o'clock that afternoon (the operation having been done at one) I found him raised in his bed; and when I asked him if he was in pain, he put his hand to the wounded part of his head. The next day he could say, yes and no, but had still a stupor. He gradually recovered; and when questioned as to the last thing which he remembered, it was taking a prize in the Mediterranean the year before; and he was found in a state of insensibility in June 1799: so that he had lived a year unconscious of his existence. He was discharged cured from the Hospital, on the 10th of July. The exact mode in which his accident had happened I could not learn; but he was found on board his ship in a state of insensibility, and was taken to Gibraltar, and to Deptford, in this state of deprivation of mental faculties and bodily power.*

It appears, therefore, that in cases of depression, we should not be prevented from trephining, however distant the period may be at which the accident occurred, if there be no inflammation; and the patient may, after a great interval, be restored to the powers of body and mind.

* Mr Cline may, perhaps, be able to add circumstances, which I have omitted in the relation of this case.

LECTURE XII.

ON WOUNDS OF THE BRAIN.

WOUNDS of the brain frequently happen without immediately producing any interruption to the operations of the mind. But should the wound be accompanied by either compression or concussion, then the particular symptoms which characterize those injuries will be present. If, however, the wound be a simple incision or laceration, it does not produce symptoms until inflammation succeeds. Indeed, considerable portions of the brain are lost, and yet the mental and bodily functions continue unimpaired. Epileptic fits and hemiplegia certainly sometimes directly follow such injuries; but, on the other hand, brain to a great extent has been lost, without considerable disturbance of either the mental or corporeal functions; numerous cases of this description are upon record; several have fallen under my own observation.

Case. — Mr Davie, an apprentice of the late Mr Chandler, came to me when I was in this Hospital, and said, ‘Look here, Sir,’ at the same time showing me a portion of brain, with a piece of the pia mater attached to it. I went to see the man, and found the representation of Mr Davie correct; there was a long transverse fracture in the os frontis, through which a portion of brain protruded. His mind was not at all affected; neither were the bodily powers in the least disturbed: no bad symptoms of any kind followed the injury; the wound healed most favourably by adhesion, and he was soon discharged from the hospital. About a year

afterwards, while I was at the house of a lady in the city, whom I was attending, a man walked into the room, and said to me, 'How do you do?' Not recollecting him, I looked at him with some surprise, when he informed me that he was the man whom I had seen before in St Thomas's Hospital, with a wound in the head, and through which he had lost some of his brain. He stated, that he had been quite well ever since; he had a depression at the part where he received the wound; was not subject to fits; and it was certain his mind had not sustained any decided injury from the accident, for he was at the time I saw him conductor of an extensive business.

It occasionally happens, when a portion of brain has been lost, that a piece of the cranium will, by being driven in, occupy its place; and if in these cases no symptoms of compression manifest themselves, you must not elevate the depressed bone; for where you do so, you would, in all probability, give rise to extravasation, or increase the hazard of inflammation. The late Mr Chandler had a patient in this Hospital who, on receiving a blow from a boat hook upon the parietal bone, had a portion of that bone driven into the brain, and at the same time a quantity of the brain was lost; at first there was hemiplegia. The depressed bone was permitted to remain, and the individual recovered.

Danger attending wounds of the brain.—The danger attending these injuries of the brain arises principally from two causes: viz, inflammation, and, the formation of fungus. 1st. Inflammation; and 2d. Fungus; but both of these may be conquered by prompt and scientific measures.

When the brain receives a wound, you must commence your curative exertions by abstracting as large a quantity of blood from the system as the

constitution of your patient will bear; not, however, to such an extent as to prevent the restorative operations of nature. Do not lower the system to such a degree as to prevent inflammation altogether, as was done by the dresser in the other Hospital, whose partiality for bleeding I mentioned to you. Though you succeed in keeping down inflammation, yet fungus will arise, and here is a preparation of the disease to which I allude. Sometimes wounds of the brain extend even to the ventricles, and you observe, that one of the lateral ventricles was opened by ulceration.

How restored. — Usually some days after the brain has been wounded, the divided parts begin to unite by the adhesive inflammation; if this process cannot effect a cure, granulations form, which, at length, project through the opening of the skull, and give rise to the fungus before mentioned. Upon proper treatment the safety of your patient depends. If you do not repress the growth of the fungus, there will be violent constitutional irritation, and the life of the person will be destroyed; but, on the contrary, if you attend to the condition of the wound, and prevent the fungus from rising, you will succeed in effecting a cure.

Treatment of fungus of the brain. — The treatment is as follows. You are to apply to the fungus a piece of lint, wetted by liquor calcis; and over this a strap of adhesive plaster; when you examine the part on the following day, you will find the fungus considerably diminished; you are then to use a thicker piece of lint, and the strapping as before; pursuing this plan, you at length bring the fungus to a level with the scalp; but this is not sufficiently low for your purpose; therefore, you must proceed until you have succeeded in getting it on a level with the bone, in which position it must be cautiously preserved, when

at last the scalp heals over it, and your object is accomplished. It is sometimes necessary to apply caustic to the fungus. I have witnessed several of these cases in our Hospitals. Formerly it was the practice in the treatment of these diseases to remove the bone contiguous to the fungus, and which, of course, rapidly increased until the patient became destroyed. The plan of treatment which I have just recommended to you is unquestionably the best; viz, that of repressing the growth of the fungus until the scalp heals over it.

This will be well illustrated by the following cases.

Case. — John Dent, a boy, aged eleven years, on the 9th of December 1803, received a severe blow from the kick of a horse, on the anterior and inferior part of the right parietal bone, by which he was stunned. The same evening he was brought into St Thomas's Hospital in a state of stupor, with a considerable tumour under the scalp. A longitudinal incision, to the length of two inches, was made, when immediately a portion of brain made its escape, about the size of a small hazel nut; and upon introducing the finger, a fracture was distinctly felt, yet no depression was evident; but on the further division of the scalp in a transverse direction, and turning back the edges, a very considerable depression was distinguished; in consequence of which the trephine was applied, and one angular piece of bone removed by the metacarpal saw; also another piece, rather more than an inch in length, which was driven into the substance of the brain, was extracted with the forceps. During the operation, small quantities of brain were escaping continually with the blood: supposed to be about 3ij or 3iiss. Every depressed portion of bone being now sufficiently elevated, the wound was dressed superficially, and, notwithstanding the

great degree of stupor and insensibility he laboured under prior to the operation, his senses returned before Mr Chandler (who operated) quitted the theatre, and from this time he appeared perfectly tranquil. The next morning he was ordered the common aperient medicine of the house, which was occasionally repeated. The wound was not dressed until the 4th day; when, upon the removal of the dressings, there appeared a disposition to fungus, arising from the brain, which continued to increase for about a fortnight: moderate degrees of pressure were had recourse to for its removal, but without success. Mr Chandler then requested that the lint (with which it was previously dressed) should be dipped in lime water, and the same degree of pressure made use of as before. His plan had not been persisted in for more than ten days, before every particle of fungus disappeared; but it was observed, a short time afterwards, that the edges of the wound assumed a glossy appearance: they were, therefore, touched over slightly, every other morning, with the sulphas cupri, which occasioned the wound to contract daily, and by the latter end of February it was completely cicatrized: on account of losing so large a portion of bone, the brain could be distinctly seen pulsating through the scalp. He lost no blood from his arm during the cure, nor did there any bad symptoms occur.

Case. — George Freeman, aged eighteen years, was admitted into St Thomas's Hospital, July 2d, 1811, under the care of Mr Birch, having a fungus tumour arising from the brain. The history of the case was as follows: Seven weeks before, while he was grazing a horse near Tunbridge Wells, he fell asleep, during which time the horse (he supposes) trod upon his head; the blow rendered him senseless, and he remained in this state, till he was found by some

men, and conveyed home. Immediately after the accident, May 20th, upon his being put to bed in a comatose state, he was bled largely from the arm; and in the evening, remaining in the same state, also having a great deal of swelling on the scalp, the cupping glasses were applied, of which he was sensible.

On the following morning a crucial incision was made through the whole of the swelling, from which there issued a portion of blood and brain. A large piece of the os frontis had penetrated through the dura mater, nearly an inch into the substance of the brain; which being removed, he became perfectly sensible when spoken to, and so continued; but the fæces and urine passed away involuntarily. Every thing appeared to do well, until the fungus cerebri* made its appearance, and gave much trouble; it was repeatedly cut away, and pressure applied; which not only produced great pain in the head, but occasioned sickness and vomiting, which immediately ceased when the pressure was removed. About the 15th of June he lost his appetite, became very sick and faint upon the least exertion; when the bark was given to him, and continued till he left the Wells.

When admitted into St Thomas's Hospital, there was a considerable loss of bone, on the os frontis, over the right eye, where the pulsation of the brain was evident. A fungus swelling, in a sloughy state, occupied the middle of the wound, which was surrounded with red fleshy granulations; and when the tumour was pressed on, he complained of severe headach, which ceased on removing the pressure. On the day following his admission I was desired to see him; and I immediately cut away the projecting part of the fungus, and recommended pressure to be made on the part by means of a bandage, applying

* These were exuberant granulations from the cerebrum.

to the wound a pledget of lint, wetted with lime water. No other treatment was found necessary; by these means the fungus was kept down, the ulcer gradually contracted, and on the 9th of August it was nearly skinned over, without one bad symptom occurring during the cure. He always complained of headach when the bandage was applied tight. He took no medicine while in the hospital.

Case.—Mr Henry, jun. of Keswick, was struck on the forehead by a portion of a small brass cannon, which burst while he was firing it; he was immediately afterwards found in a senseless state, but was in a few minutes able to rise and speak. Mr Edmondstone, surgeon, was called to see him, and arrived ten minutes after the accident; he found a wound over the left eyebrow, which he enlarged, and then discovered a comminuted fracture of the skull: the fractured portions of bone were loose, and detached; the dura mater was lacerated, so as to allow of the escape of about a tea-spoonful of the substance of the brain. The loose portions of bone were removed, and the wound dressed. Soon after the operation he was sick; and his pulse being hard, he was bled twice in the following night. On the next day some more brain in small quantity was removed with the dressing. A fortnight after the accident a fungus arose from the brain, which was treated by the pressure of lint dipped in lime water, which considerably repressed its growth. Whilst pursuing the above plan of treatment, he one day complained of severe pain in his neck, for which he was bled freely; when in a few hours after, the fungus suddenly decreased, and soon entirely disappeared. The wound healed in fourteen weeks, and he has since remained well.

REMARKS.

I observed a circumstance in this young gentleman, after his cure, which shows the influence of mental excitement in agitating the brain, and in increasing, upon the instant, the quickness of its action. Something passed in conversation which displeased him; and his brain, which could be distinctly seen beating through the opening in his skull, immediately quickened from 80 to 120 in the minute: struck with this appearance, I watched it for a few minutes, and as his mind became calm, the pulsation gradually sunk again to about 80. He had a great dislike to and apprehension of the finger being applied to the injured part; and as soon as I touched it he receded from me, and I saw his brain beating with extraordinary velocity. These circumstances strongly impress a conviction of the influence of mental and corporeal excitement, and of the necessity which exists of guarding against the one and the other.

OF INFLAMMATION OF THE BRAIN.

I shall now speak more particularly of the inflammation which follows injuries of the brain, in which their chief danger consists.

Symptoms of inflammation.—Upon the first approach of inflammation, the person complains of great pain in the head, very quickly falls into a comatose state, and when roused from this condition the pain is excessive; the scalp around the external wound becomes œdematous; and if you press upon it, the impression of the finger is retained; the surface of the wound has a shining glossy appearance, and from the wound itself is discharged a fluid, of a sanious

colour; the edges of the wound have a sloughy appearance; the countenance is very much flushed, the eyes are red, the skin is hot, and the carotid arteries beat with very great force; so much so, that if the collar of the shirt be open, you can see the pulsation of these arteries at some distance from the bed; this circumstance of itself would be quite sufficient to convince you that there was a great determination of blood to the brain. Next the patient is seized with rigors, and these follow in very quick succession; hemiplegia often attends, and is generally situated on the opposite side of the body to that of injury to the brain. Violent convulsions of that side of the body occasionally occur; the patient remains in a comatose state, but when roused will give (until towards the very close of life) rational answers to such questions as may be put to him. These, then, are the ordinary symptoms of inflammation of the brain arising from wounds of that organ.

Formation of matter and its situation. — If the inflammation terminates in suppuration, the matter will be situated, either between the dura mater and skull, pia mater and tunica arachnoides, pia mater and surface of the brain; or, lastly, in the brain itself.

Between the skull and dura mater. — When pus is situated between the dura mater and skull, trephining for its removal is attended with success; but it is comparatively rarely there, as it is generally situated between the pia mater and surface of the brain, for which an operation will be useless.

Another situation in which matter has been found is in the longitudinal sinus of the dura mater.

Case. — Mrs P. aged twenty-two, was admitted into St Thomas's Hospital, on the 23d of June, on account of an affection of the head. Sixteen months previous to her coming to the Hospital, she had re-

ceived a blow on the forehead from falling against a chest of drawers. This caused a small wound, with considerable contusion, which soon disappeared by the application of a spirituous lotion; but still she had some pain and a sense of weight in the head: this increased, and at the end of eight months was extremely severe, and she had epileptic fits. She was shortly afterwards much relieved by a discharge of a purulent character from the nose and ears, which continued three days, when it subsided, and the symptoms again became as violent as ever, but were again diminished by a second similar discharge; this occurred repeatedly, but she did not experience any permanent relief, as the symptoms always returned when the morbid secretion stopped. Having tried numerous remedies without procuring ease, she applied at St Thomas's Hospital, and was admitted under the care of Dr Blane,* and received so much benefit from the treatment he adopted (which consisted of blisters and opiates chiefly) as to be able in six or eight weeks to quit the Hospital. Shortly after her dismissal, however, the old train of symptoms re-appeared as violently as before, and she came into the hospital a second time, when she had entirely lost her appetite, was very thirsty, had most distressing pain in her head; she slept but little, was extremely restless and irritable, so much so that any sudden disturbance caused convulsions: the pain was chiefly confined to the part on which she had received the blow, and pressure on this spot gave rise to great uneasiness. The former plan of treatment was adopted without affording her any relief, and she evidently got worse, being at times quite comatose. A crucial incision was made into the scalp by Mr Birch, to ascertain if any disease of the

* Now Sir Gilbert Blane, Bart.

pericranium or bone existed, but not any was discovered. When this wound began to discharge, the symptoms were, in a degree, relieved. The discharge was, at first, healthy; but after a short period became fœtid; the pericranium separated, and exposed a carious state of the subjacent bone. She continued in this state for a considerable time, when it was discovered that some pus escaped through a carious opening in the bone, which was evidently influenced by the pulsations of the brain: the trephine was, therefore, applied, and a portion of bone raised to allow of a more ready escape for the pus; little appeared, but the dura mater was found highly inflamed, and had a gangrenous hue. After the operation she got worse, and expired early the next morning, about nineteen months after the receipt of the injury.

DISSECTION.

The dura mater opposite the wound was in a sloughy state, and on opening the longitudinal sinus a long abscess was found, which contained about two drachms of matter. The brain itself appeared sound.

This is the only example of the kind I have witnessed.

Between the pia mater and brain. — The next part in which matter is situated is between the tunica arachnoides, pia mater, and brain itself. This last is the usual place, and in this case the matter is diffused over the hemispheres of the brain, in the same manner as I mentioned to you the other evening blood is, when extravasated on that organ. When the matter is seated between the pia mater and brain, it will be of no use to open the dura mater, as very little will be discharged, there being no com-

munication between one part and another ; for the matter is contained between the vessels which pass from the pia mater and brain.

Case. — December 23, 1815. A driver, belonging to the royal artillery, was kicked on the forehead by a horse, and was taken up perfectly insensible. On examination, a wound was found, with considerable fracture and depression of the frontal bone, immediately above its sinuses. He was taken to the General Hospital, where the surgeon on duty, after enlarging the wound to ascertain the extent of injury, raised the depressed portions of bone, and removed several which were completely detached ; the dura mater was lacerated, and some small portion of brain escaped during the operation. In the evening he appeared tranquil, and his bowels were freely open. 24th : Had passed a quiet night, was sensible, and felt comfortable. Purgatives ordered. He continued to go on well for several days. On the 28th, a fungus of the brain protruded through the wound, and gradually increased. On the 2d of January, he complained of pain in his head, and moaned a good deal. 4th. The fungus having protruded more, a consultation was held, and it was determined that a ligature should be applied to its base, as pressure produced immediate loss of sensation. The portion of brain removed by the ligature was of a dark colour : very slight hæmorrhage followed. On the 6th, another ligature was applied, and on the following night a considerable bleeding occurred. The fungus continued to protrude in spite of the ligatures : he became insensible ; slept continually ; did not take notice when roused, and gradually sunk, expiring on the morning of the 14th.

DISSECTION.

Some portion of the inner table of the frontal bone was depressed; a quantity of pus was situated beneath the dura mater, near the seat of injury. The fracture extended through the petrous portion of the temporal bone to the foramen lacerum. The right hemisphere of the cerebrum was in a soft state, and appeared to have been lacerated. Another collection of pus was found under the longitudinal sinus of the dura mater.

In the substance of the brain. — The next situation in which matter is found is in the substance of the brain itself. It is lodged in various parts, and the only circumstance very curious in this complaint is, that you would not suppose, from the symptoms, that matter was forming; they are those of compression rather than irritation. If the membranes of the brain be attacked with inflammation, symptoms of irritation will be present; but if the brain itself, they will be those of compression; and the circumstance which surprises a person who examines the brain of an individual, in which matter has been formed, is, that so little constitutional irritation existed during its formation.

Case. — Mary Harris, æt 16, was admitted into Guy's Hospital, under the care of Dr Marcet, having a constant severe pain in her head, which she referred chiefly to its fore part: — three months before she had fallen down a staircase and struck her head. She was quite sensible, and her intellectual faculties were unimpaired. She mostly kept her bed; was inclined to be comatose, but could be easily roused: had no appetite or thirst, and the attempt to take food frequently occasioned vomiting. Some time after her admission into the Hospital, she

died suddenly, being much convulsed, and her breathing stertorous for two hours preceding her death.

DISSECTION.

Two abscesses were found in the right lobe of the cerebellum, one containing about 3ij the other 3ss of matter. Some slight serous effusion existed between the pia mater and tunica arachnoides. The dura mater adhered very firmly, and appeared more vascular than usual.

Case. — A boy, 13 years of age, fell from a scaffold, on which he was playing, and fractured the left parietal bone. On examination it was found, that not only a fracture of considerable extent existed, but also that portions of bone were driven through the membrane into the substance of the brain. The trephine was immediately applied, and as many portions of the depressed bone were removed as could be readily found. The brain was found much lacerated, and there was a partial loss of motion on the opposite side of the body. The patient was now put to bed, and continued for seven days without any bad symptoms, except the loss of motion on the right side of the body. He rested well, and his appetite was good. On the eighth day, however, the loss of motion on the right side of the body became complete; but at the same time there were very painful sensations in it. He was often supplicating the nurse to rub his arm: he began to lose his appetite: his pulse became quick and weak; and fungous granulations were observed to sprout from the wound, from which there was also a considerable discharge. His appetite continued bad for some time, and his pulse was quick and weak; but then these

symptoms vanished, giving way to appearances which indicated less danger; that is, his appetite returned; his pulse became fuller; he did not complain so much of pain in the right side of the body. These favourable symptoms were but of short duration; but although he became more irritable, he remained perfectly sensible. The symptoms continued thus alternating for the space of a month, sometimes giving hopes of recovery, at others producing apprehensions of a speedy dissolution. At length his pulse became exceedingly quick, and so weak as to be scarcely perceptible: the discharge was more considerable: the fungus sloughed, and another formed; and within two days of five weeks after the accident, he expired.

DISSECTION.

The dura mater was found to adhere to the left hemisphere, in which a considerable opening was found, leading into a large cavity: at the superior part of this cavity was situated a detached portion of bone. This cavity was an abscess, which probably had been formed from the irritation of the portion of bone; it extended downwards into the ventricles, which it had ulcerated, and which were found very much distended with pus. The opening of communication between the ventricles was much dilated; the surface of the brain, through every part, had considerable marks of inflammation, and purulent matter had been effused between the folds of the pia mater.

There is a curious specimen in the collection, taken from a child which I had under my care, and on whom I performed the operation of trephining. A young child was playing in a yard where there were some fowls feeding, when it received a wound on

the head from the beak of a cock. The mother, hearing the child shriek, ran to the spot, and found that there was a small wound of the scalp, and, thinking there was no serious injury, she bound it up; but, a week afterwards, pain in the head came on, together with great constitutional irritation, and the child was brought to me. On examining the head, I found that a circular wound had been made in the bone, and that matter issued through the opening, I said to the mother, If the child is not better to-morrow, bring it to me, and I will make a more free opening for the discharge of the matter. The next day the child was brought to my house, and I performed the operation of trephining, when I found there was an opening in the dura mater and pia mater corresponding to that in the bone; the symptoms of irritation were relieved by the operation, those of compression still continued, and in three days the child died. On examining the part after death, I found there was a circular wound in the dura mater, the edges of which were hardened and thickened, and as you see in the preparation, a similar wound of the pia mater and brain, in size corresponding to the external opening, and an abscess between the pia mater and brain. At that time I had no idea that a wound of the description I have just mentioned could be produced by a bird of this size; but since that period I have seen an instance of a similar kind; an Indian pheasant made a dart at a child, which was playing near it as it fed, and struck a hole into the superior maxillary bone, just below the orbit.

I shall mention two more cases of wounded brain, which are extremely curious and interesting.

Case.—Master C. W. aged 12 years, received a wound on the left temple from a slug, about the size of a pea, which was discharged from a spring

gun. He bled profusely, vomited, and was inclined to stupor; but, on being roused, appeared aware of the persons about him: his pulse was small and tremulous; his countenance swollen and pallid; and the skin bedewed with a cold moisture. On being undressed, he made free use of his limbs in extricating himself from his clothes; but in a few hours after, all the symptoms of compression came on; for which purgatives, bleeding, blisters, and cold applications were had recourse to. Two days after he became paralytic on the right side, when the wound was enlarged to ascertain the extent of injury; an opening was found in the temporal bone, just above the zygoma, and a portion of brain appeared at the aperture, about the size of a large pea; but there being no depression, the wound was closed, and the former remedies persevered in. By degrees the coma and other symptoms subsided, and although the intellectual energy may be said to be quite recovered, yet the paralysis continues.

Previous to the accident, the young gentleman had suffered severely from enteritis, followed by glandular enlargement and suppuration. Perhaps, to the weakened state of his health at the time of the injury, together with the large quantity of blood he lost in the first instance, and the active treatment subsequently persevered in, is to be attributed the favourable termination of this case, where a foreign body had entered, and in all probability is still lodged in the substance of the brain.

Case. — Mr Thompson was admitted into St Thomas's Hospital, at two o'clock on Friday afternoon, having been wounded in the head by a pistol shot. The left temporal bone was fractured, and there was a wound in the scalp over the parietal bone; but no communication could be discovered between it and the wound over the temporal bone.

Mr Travers shortly after saw the patient, and found it necessary to dilate the wound; to enable him to raise the depressed bone, of which he removed five portions. There was a considerable bleeding from beneath the bone, but the dura mater appeared uninjured. The wound was dressed, and the patient ordered to be kept quiet. There was some oozing of blood from the left ear; and the patient, although confused and agitated, gave rational answers to any questions put to him. At five o'clock he took some castor oil, but immediately brought it up again, and vomited repeatedly after. About half past nine he suddenly jumped out of bed, and complained bitterly of the restraint put upon him; but was again placed in bed. At ten he complained of thirst, and called incessantly for water; two hours after, his pulse having become quick and hard, he was bled from the arm; this was done with much difficulty, as he resisted powerfully: in less than two hours the pulse could scarcely be felt at the wrist, his extremities were cold, his pupils dilated, and his breathing stertorous. At two o'clock he again became almost unmanageable, and coma appeared to be rapidly increasing; but he still answered questions rationally, when roused: he now dosed until four o'clock, but was very restless; at which time some hæmorrhage took place from the wound, and he was quite insensible. His pulse became very feeble and hurried, his pupils dilated and quite insensible to light, and he continued in a state of torpor until twelve o'clock; when, contrary to all expectation, he again in a degree rallied; his pulse rose, the body became hot, and he was excessively restless; half an hour after he had several convulsive fits, and then became so composed as to take a cup of tea; but again suddenly relapsed into a state of stupor. About two o'clock he had some more convulsions, foaming at

the mouth, and making frequent exclamations; he became so violent that the strait waistcoat was applied; this continued until five o'clock, when he became more quiet and perspired profusely; he then gradually got weaker, had subsultus tendinum, and the right side was paralysed; subsequently he had strabismus, the countenance was horridly distorted, and he occasionally struggled violently; a frothy mucus was discharged from the mouth and nostrils, the pupils became very much contracted and fixed, and at half past two o'clock he expired.

DISSECTION.

The fracture extended from the temporal bone in one direction into the orbit, in another to the sagittal suture, and in a third to the mastoid process; several loose portions of bone were found on the dura mater, which was discovered to be lacerated. On raising the upper part of the cranium, a quantity of soft brain issued from the wound. The dura mater was much inflamed, particularly on the left side and posterior part. Under the dura mater was a collection of dark-coloured serum, and a layer of extravasated blood over the left hemisphere. The substance of the brain, on being cut into, exhibited numerous red points. The ball was found in the anterior part of the middle lobe of the left hemisphere, the brain around it was soft and of a dark colour. The vessels, in all parts of the brain and its membranes, were extremely turgid.

Time at which inflammation occurs.—The time at which inflammation of the brain supervenes, after the injury has been received, is generally about a week, rarely less than that time; and this it was that led me to say, on another occasion, that inflam-

mation of the brain was more slow in its occurrence than that of most other organs. It often happens that inflammation of the brain does not come on till a fortnight or even three weeks after the injury. Every surgeon who has written on the subject puts his reader on his guard about the distance of time that complaint supervenes after the accident; he tells you the patient is not safe till two or three weeks afterwards. If you read the works of Mr Pott on the injuries of the head, you will find the circumstance mentioned; and in the work of Mr Dease, of Dublin, it is distinctly stated, that inflammation of the brain is occasionally postponed to three or four weeks after the accident occurs, and even then the patient is not safe.

Case. — I will give you a case relating to this subject. Dr Babington and myself were sent for to see a person, a clerk to the firm of Whitbread and Co. who, whilst riding on horseback, (being a short-sighted man) struck himself violently against the bough of a tree, and was brought to the ground by the force of the blow. He was taken to Croydon, where Dr B. and myself visited him. We found that he had been struck on the *os frontis*, just above the frontal sinuses, where there was a depression; and this was the first case in which I witnessed emphysema of the forehead produced by blowing the nose. We took all possible care of the patient, bled him, regulated his diet, &c, till the inflammation had subsided. He came to town three weeks after the accident; and about three months afterwards, he asked whether he might go to Rochester to spend a little time with some friends; we told him that he might, if he would pay attention to himself, keep his bowels open, and regulate his diet. After the lapse of a few days, he became extremely ill with inflammation of the brain, and he died. On inquiry, we found that

he had neglected the directions given him, and allowed his bowels to be costive.

The following case also shows the necessity of keeping the patient from any exertion.

Case. — On the 8th of June, the son of Mr J. S. fell from a ladder on some spikes, one of which penetrated his skull. The wound bled freely, and a considerable portion of the substance of the brain came away, also several portions of bone, when the wound was enlarged to ascertain the extent of injury: he was insensible at times for several days after the accident. On the 27th, he walked a mile to the house of his medical attendant, Mr Bethune, of Brighton, and appeared in a very favourable state for recovery. He had been particularly cautioned as to the necessity of his refraining from all kinds of exertion. On his return home, his brothers were playing at cricket, when he imprudently and unfortunately joined them. Inflammation of the brain was the consequence, of which he died in two days.

It always requires great care when there is considerable depression remaining after an accident; and I will mention to you an instance of this kind, which will show you the necessity of enjoining a patient in this state strict attention to his mode of living. A man, who had received a wound in the head from a pistol shot, came to this Hospital: the wound healed kindly, but the depression remained. Whenever this man indulged even in the moderate use of spirituous liquors, he used to have violent pain in the head, which was only relieved by bloodletting.

Treatment of inflammation of the brain. — As to the treatment of inflammation of the brain, it is the same as is required for inflammation in general; with this exception only, that the blood should be drawn from the temporal artery in adults, and the jugular vein in children: by these means you abstract blood

more readily from the part; even in adults you may, after opening the temporal artery, if the symptoms be not relieved, bleed from the jugular vein. In addition to this treatment, you purge, produce perspiration, and apply blisters to the head. I have seen poultices applied to the scalp, containing stimulating applications, of considerable use. The patient is to abstain from every species of stimulus.

OF THE OPERATION OF TREPHINING.

This operation will be required under the following circumstances.

1st. Where there is extravasation of blood between the dura mater and skull.

2d. In fractures of the skull, with symptoms of compression continuing after depletion.

3d. In simple fractures with depression and continued symptoms of compression.

4th. In compound fracture with depression, unattended with symptoms of compression, it is best to trephine, or to raise the depressed bone by the elevator.

5th. When matter has formed.

It generally happens in these last cases, when matter is seated between the dura mater and skull, that there is fracture; and this is an indication of the seat of the injury which has been done to the brain, it is also followed by rigors and other symptoms, which indicate its presence; still it would be right, in cases in which there is no fracture, and the other symptoms, rigors, &c, are present, to penetrate the bone, to see whether matter is lodged between it and the dura mater. When an abscess is placed beneath the dura mater, I have never seen a case recover from trephining for it, although that membrane has been opened for its discharge.*

* If the dura mater be punctured, the pia mater should be punctured also, as adhesion will more readily occur.

The operation of trephining used to be of the most complicated kind, requiring several instruments; to learn the names and use of which was of itself a study. It is now simple, and few instruments are necessary. Three will be quite sufficient; viz, a knife with a double edge, in order to separate the pericranium from the bone; an elevator; and a trephine, having a crown; and a pin which will allow of being moved with facility.

Parts on which the trephine must not be applied. — There are several parts of the skull on which the trephine should not be applied. First, you should never place it on the median line, which extends from above the nose to the tuberosity of the occiput, on account of the intimate connexion between the dura mater and bone; as well as to avoid the longitudinal sinus on the fore and upper part, and the perpendicular ridge of the occipital bone at the posterior portion. Over the frontal sinuses the trephine could not be used with any effect. There are two other points which it is necessary to avoid: the anterior inferior angle, and the posterior inferior angle of the parietal bone; the first on account of the artery of the dura mater, which penetrates there the parietal bone; and under the second, the lateral sinus is situated. If depression occurs at any of these points, the trephine must be applied at a little distance.

Elevator to be used alone, if possible. — Fractured portions of bone may be often raised by the elevator, and I may observe here, that this is the instrument I recommend in cases in which it can be employed without the use of the trephine.

Hey's saw. — The saw which Mr Hey has recommended may be useful in removing an angle of bone, to admit the elevator.

Mode of performing the operation. — The mode of trephining is as follows: you are called to a case, in

which there is a wound of the scalp, with fracture and depression of the bone; you introduce your finger into the wound, in order to ascertain the extent of the depression. If necessary, you then enlarge the wound, in the direction of the fracture; and if the depression be extensive, you should make a crucial incision, and turn aside the integuments from the part at which you attend to apply the trephine, cut through the pericranium, and separate it from that part of the bone on which the crown of the trephine will act. The pin of the trephine is to be pushed down, and placed on the sound bone, as near to its fractured edge as it can with safety; by this means the portion of bone removed will be in size very little more than that of half of the circle of the instrument. As soon as the teeth of the trephine have entered the bone, and made sufficient way to prevent the instrument from slipping, the pin is to be raised, and the sawing continued. I never saw the pin do any mischief; but my nephew once witnessed an operation in which it perforated the dura mater, the surgeon having forgotten to raise it. When using the saw, let your bearing on it be as equal as possible, and the motion such as the radius will permit, the ulna being fixed: as you proceed in the operation you must frequently introduce a probe into the groove made by the saw, to ascertain how far you have proceeded. In operating on persons of middle age, you may know that you are more than half through by the bleeding which takes place when the diploe is wounded; but in very young or old persons, in whose skulls little or no diploe exists, a few turns of the saw are sufficient to penetrate both tables of the cranium. When you have sawn through at one part, introduce the elevator, separate the remaining part, and raise the bone which may be easily accomplished, and will prevent the danger of wounding the dura mater.

Danger of the operation. — Some surgeons say, that this is a trifling operation, and not difficult to perform; but they would deceive you; it is one of the most dangerous operations in surgery: whilst performing it, there is but a thin web between the instrument and the brain; cut through this, and destruction of life will generally be the consequence. Mr Hunter thought that when the dura mater was wounded the person scarcely ever recovered; which opinion, though not exactly borne out by the cases which have since occurred, show the impression made on the mind of a man who was so great an observer of nature. It is certain, that there is less danger when the dura mater and pia mater are both wounded, than where the dura mater alone is injured. I will tell you the reason: in the former case, where both the dura mater and pia mater are wounded, the brain immediately projects and fills the wound. If I were to pass quicksilver through an opening in the dura mater, where would it go? into the lower part of the spine, between the tunica arachnoides and the dura mater; inflammation of the dura mater spreads over the whole cavity, as erysipelas does over the surface of the body; whereas, in the first kind of injury, fungus granulations will project through the opening, which would easily close by the process of adhesion. I have seen many instances where the dura mater and pia mater have been wounded, and the patients recover; but few where the dura mater has been wounded alone.

Treatment after the operation. — After trephining, the elevator should be introduced to raise the depressed bone, and thus return it to its natural situation. You see there is no necessity to operate where there is any additional risk, because an oper-

ation in a part where there is no such risk, can be as well performed, and the elevator be introduced under the depressed bone. The scalp is to be returned over the opening, and the poultice should be applied, which, I believe, is the application most congenial with the feelings, and most conducive to the safety of the patient.

If there be a necessity for taking away more than one portion of bone, the same plan is to be pursued in each operation.

OF WOUNDS ON THE SCALP.

Dangerous. — Wounds of the scalp are not devoid of danger; and I have known several instances in which apparently slight injuries of that part have destroyed life. Incised wounds are certainly less liable to produce deleterious effects than the lacerated or contused; although I knew a lady, of high consequence in the country, die from the removal of an encysted tumour in the scalp.

Cause of danger. — The cause of the danger attending such wounds is the free communication by blood vessels between the scalp and dura mater; as the vessels of the pericranium freely anastomose with those of the dura mater through the diploe of the skull, and, therefore, inflammation lighted up in the one, is readily extending its influence to the other. There cannot be, therefore, a more absurd and injudicious practice than that of wantonly making incisions through the scalp, to ascertain the exact extent of the injury which the bone may have received, when there are no symptoms to justify such a procedure; because such incisions produce new dangers to the patient, as well as add to that which the injury would itself produce. If, therefore, I am called to a case of injury of the head, in

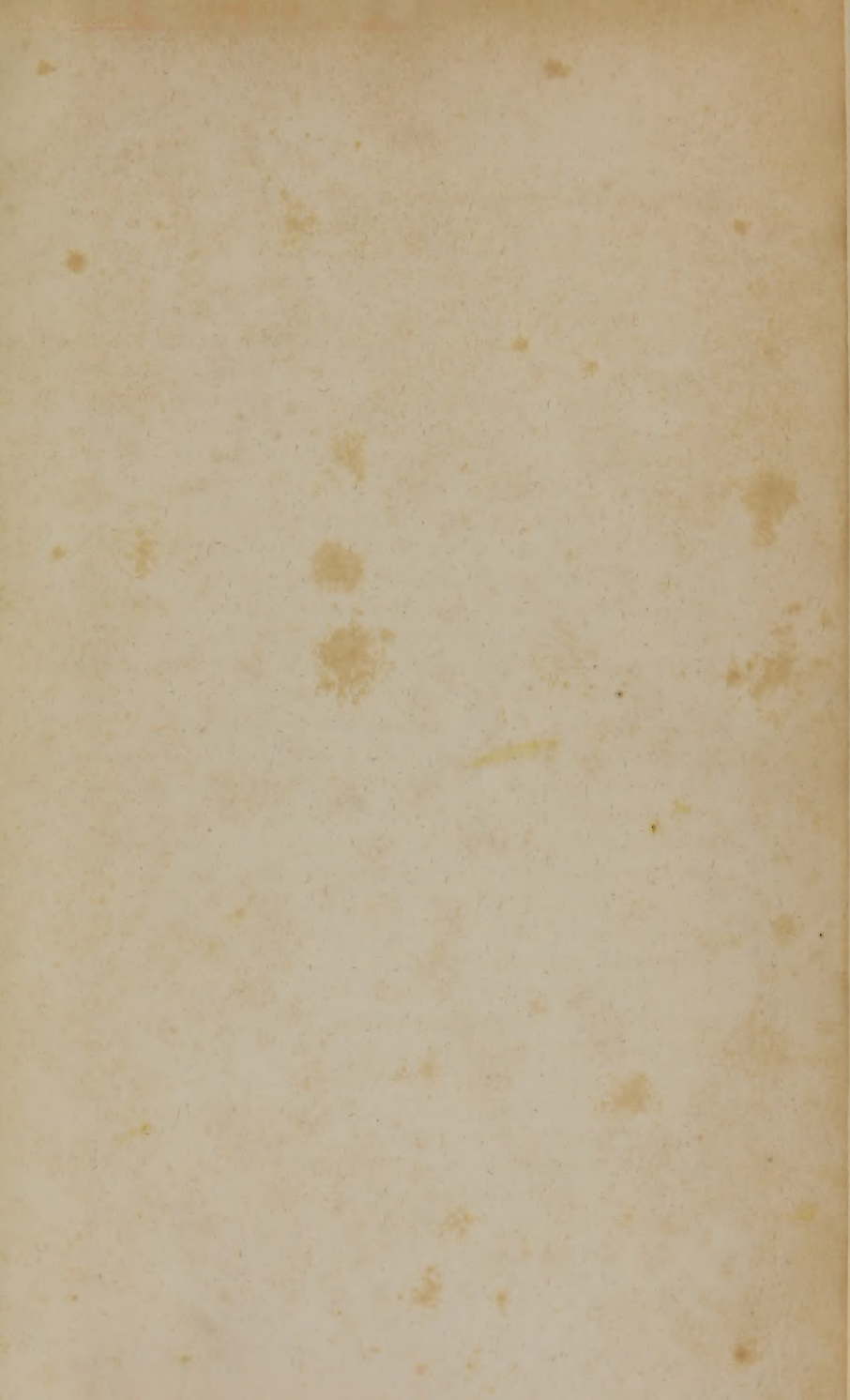
which there is apparent depression of the skull, yet there are no symptoms of injury of the brain, I would not render that fracture compound by making an incision through the scalp; and even if there were symptoms of injury of the brain, I would try the effect of free depletion, before I made an incision, as the loss of blood sometimes occasions the entire removal of the symptoms; but if there were already a wound in the scalp, and my finger passed down to a depressed portion of bone, I would immediately use an elevator to raise it, which may be generally done in children without difficulty, and in the adult would saw off a portion of bone to admit the elevator.

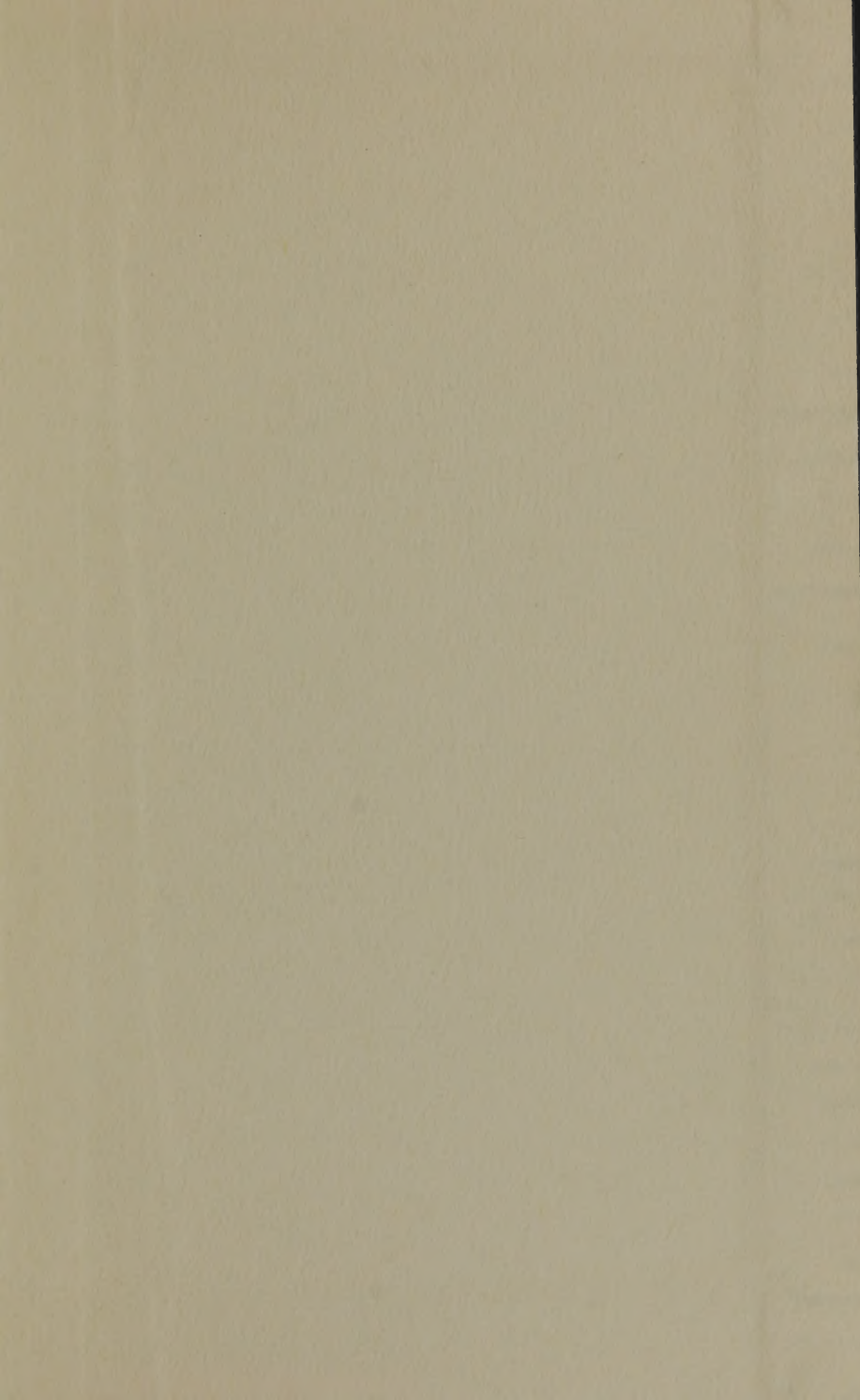
Mode in which they destroy life. — The modes in which wounds of the scalp prove destructive to life are threefold: first, by producing what is called, an erysipelatous inflammation on the head; secondly, by producing extensive suppuration under the tendon of the occipito frontalis; thirdly, by rendering a simple fracture compound, they produce a more extended inflammation of the dura mater. With respect to the first of these, the following case of it is frequent. A man comes to the Hospital, and shows a wound of the scalp, which he has received, perhaps, in some drunken affray; a slight dressing is applied to the wound, and the case is considered as too slight for admission; in a few days the man returns with the scalp excessively tumid, and of a florid red colour, and he requests admission; his face soon becomes swollen, his eyes are closed by the tumefaction of his eyelids, and he has a high degree of constitutional irritation: in a day or two I have seen him in a low muttering delirium; he then becomes comatose, and dies with symptoms of compressed brain. Several of these cases have been examined, one more particularly by my former apprentice, Mr Callaway, who found that there was great effusion

in the scalp, between the occipito frontalis and pericranium, and also between the tunica arachnoides and pia mater. Although this inflammation is said to be erysipelas, and is treated as that disease by giving bark, and other tonics, yet I believe both its cause and its treatment are mistaken: as far as I am able to judge, it is the result of tendinous inflammation of the occipito frontalis, extending from thence to the skin of the head and neck, and that its treatment should be rather evacuant than repleting, as the danger results from the extension of inflammation to the membranes of the brain.

The second mode in which wounds of the scalp produce deleterious effects, is by exciting suppuration under the tendon of the occipito frontalis: such abscesses should be opened early, to prevent the matter extending over a large surface of the skull.

The third mode in which wounds of the scalp prove destructive, is by incisions being made to trace fractures of the skull, producing in this way great aggravation of the inflammation, and extending its influence to the membranes of the brain. An incision in the scalp should, therefore, be never made but in cases of imperious necessity.





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